THE

JOURNAL

OF

GAS LIGHTING,

WATER SUPPLY,

Etc.

126548

VOL. LXXXII.

APRIL TO JUNE, 1903.

LONDON:

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXII. No. 2082.] LONDON, APRIL 7, 1903. [55TH YEAR. PRICE 6d.

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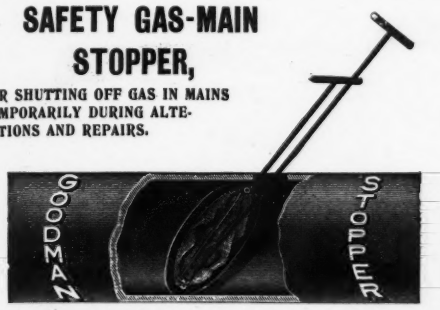

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PRICES AND PARTICULARS ON APPLICATION.

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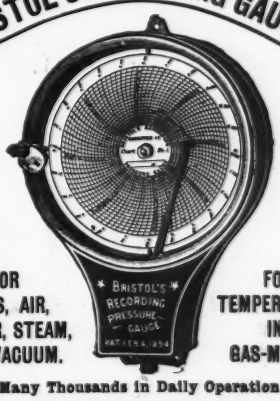

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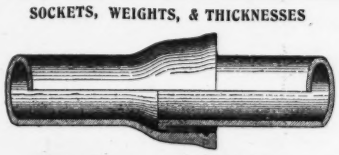

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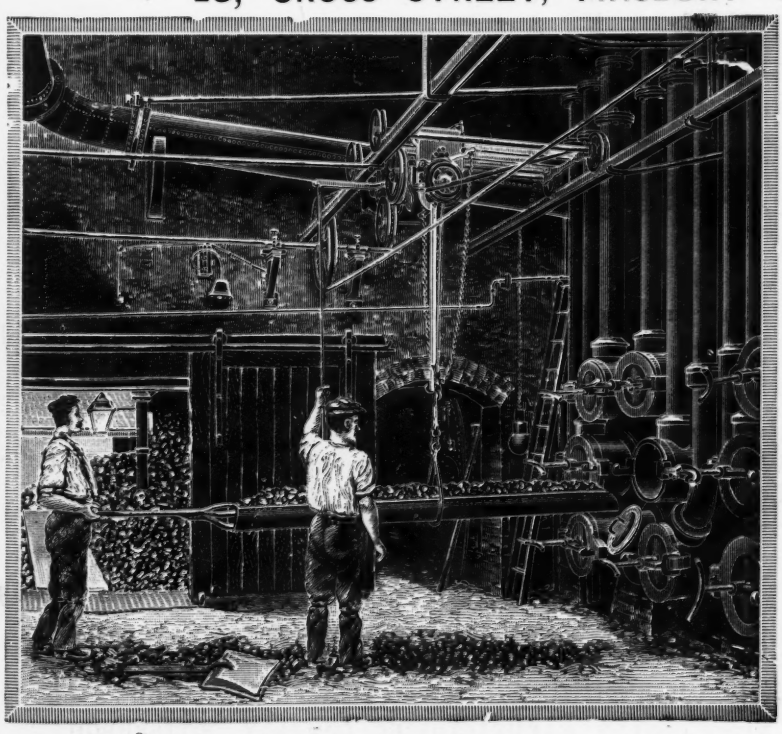

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Machines can be seen working at any of the following Works:—

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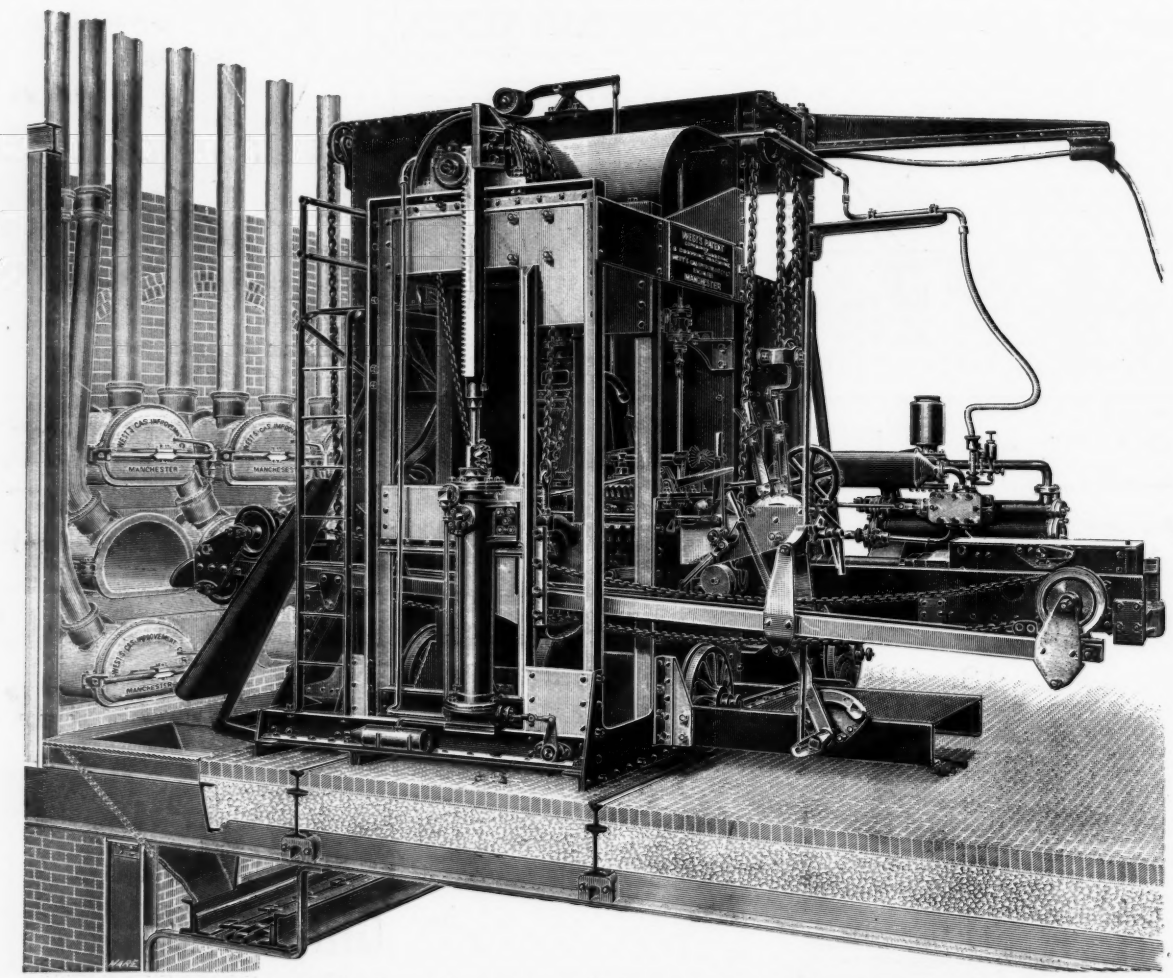

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All classes of Coal can be efficiently dealt with by the West's Charging Machines, and the Retorts are charged evenly throughout with the full weight of Coal.

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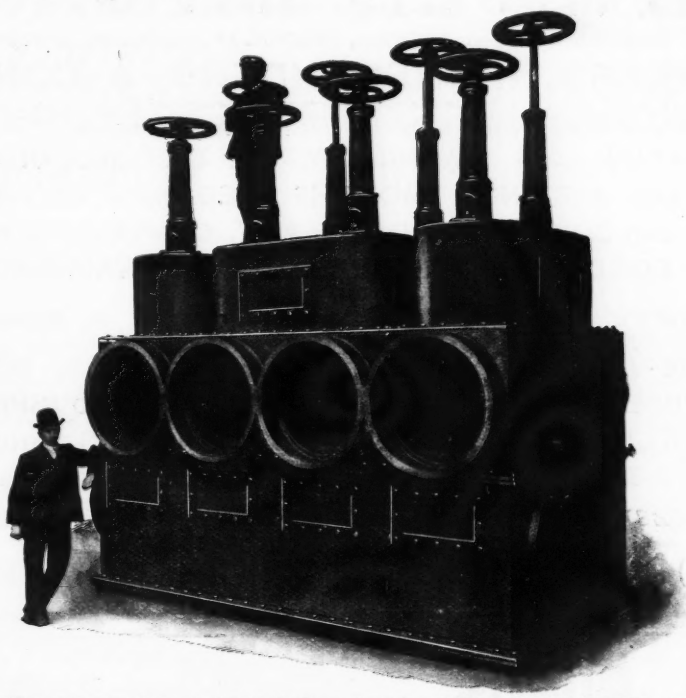

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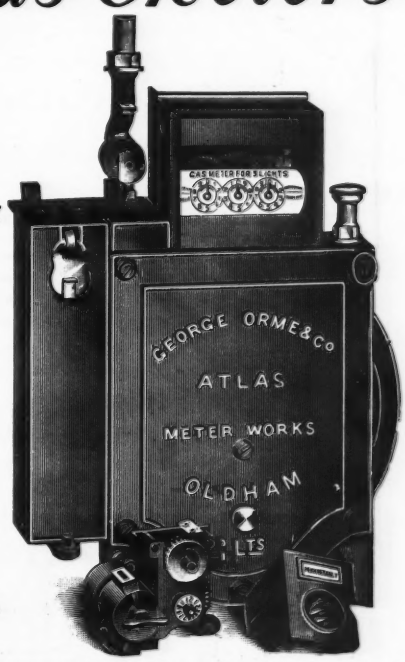

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INCANDESCENT GAS MANTLE
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The Company continue to make the original "**DURA**" Mantle.

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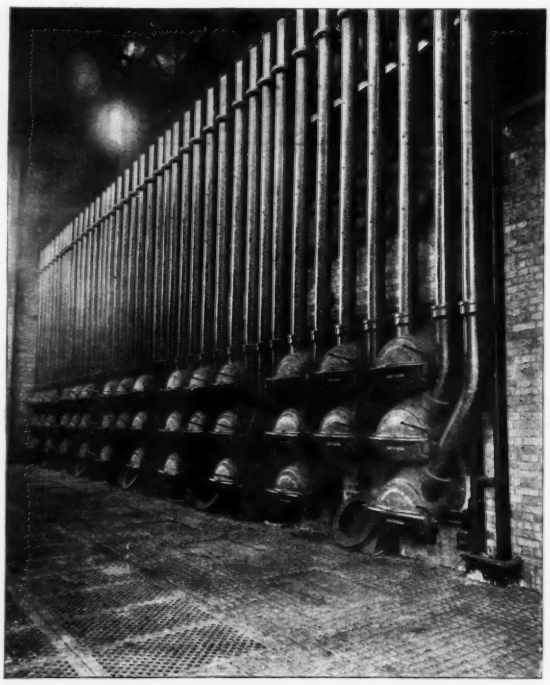

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for nothing but the Highest Class of Work, as can be seen in our Illustrations at Smethwick, Leek, Liverpool, Malvern, Shipley, &c., &c.

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PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

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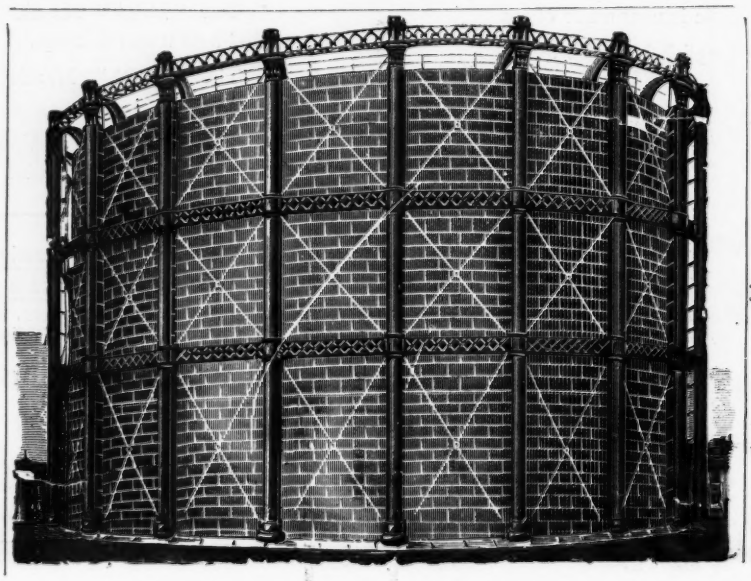

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TIPTON,
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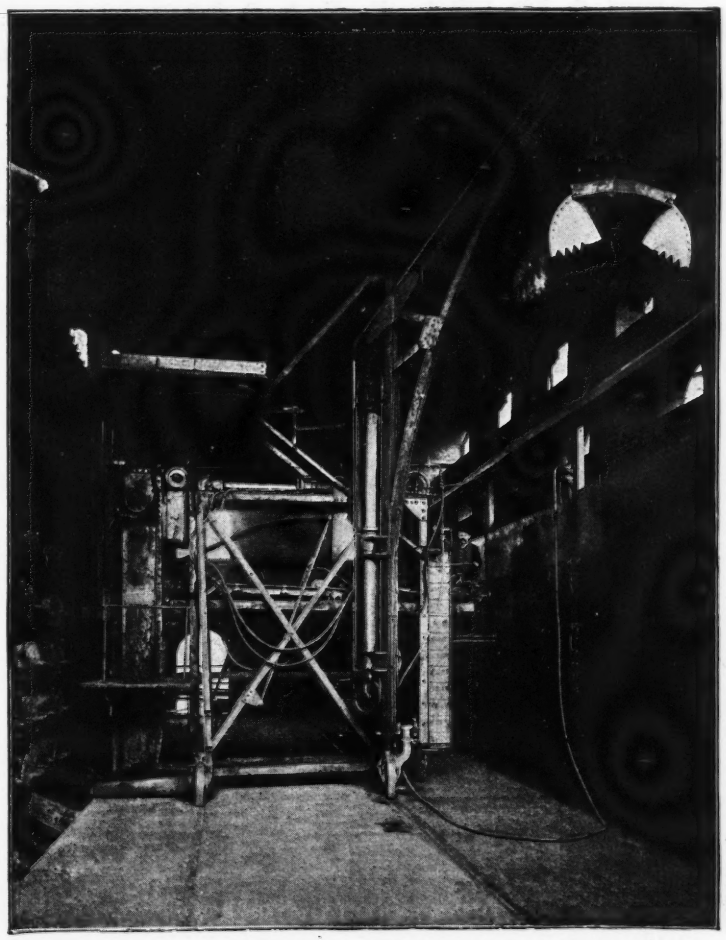
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.

BRIGHTON GAS-WORKS.



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Have proved the most successful for Street Lighting and Maintenance.

AVERAGE LIGHT 95 CANDLES.
KEEP THEIR SHAPE.
WILL STAND ROUGH HANDLING.
LAST LONGEST.

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Works: DARLINGTON.

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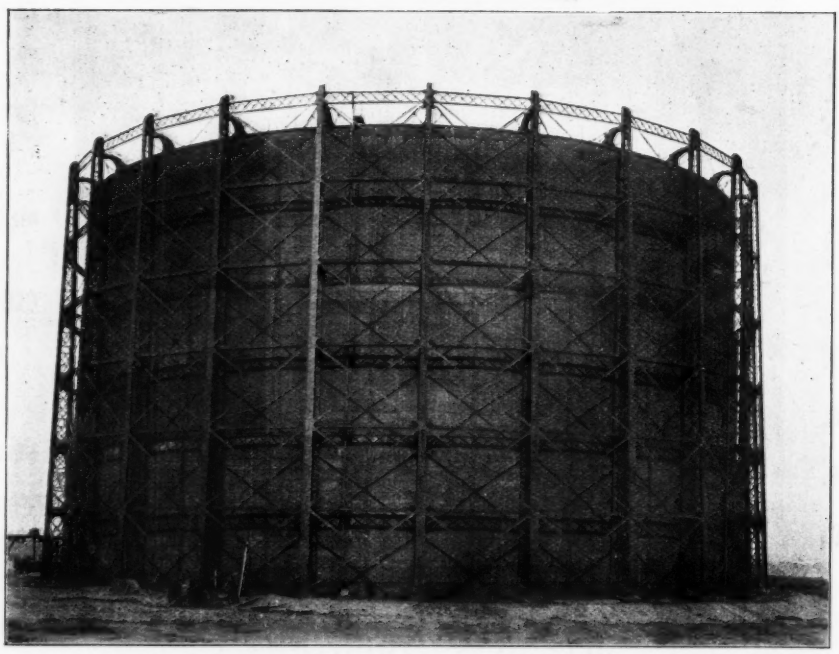

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NEWCASTLE AND GATESHEAD GAS CO
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THREE-LIFT GASHOLDER.
CAPACITY 6 MILLION CUB. FT.

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"SPECIALS" For Globe Holders.

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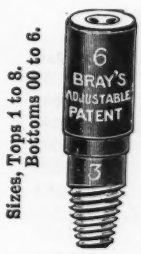

Union-Jet.

Slit-Union.

"MARKETS."

Union-Jet.

Batswing.

"REGULATORS."

Union-Jet.

Batswing.

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"GAS ECONOMISERS."

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These Burners are specially Strong so as to take the grip of the pliers without injuring the tips. For use in "Geysers" and the like.

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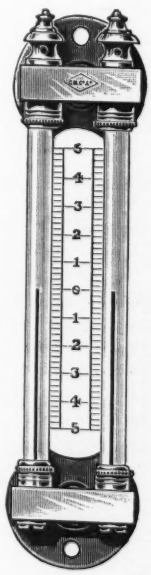

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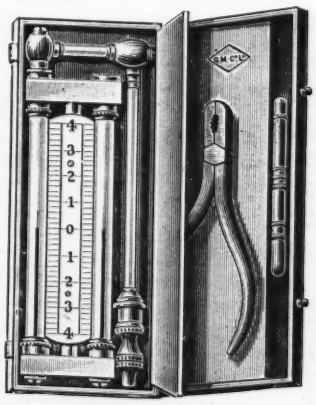
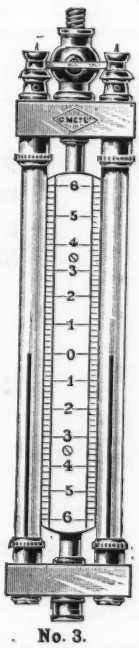


Inspector's Pocket Gauge.



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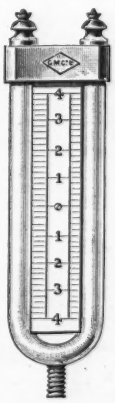

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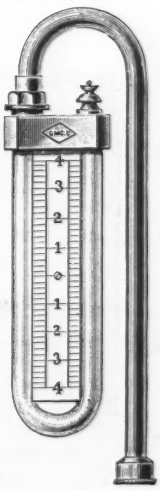

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Works: 238, Kingsland Road, LONDON; Union Street, OLDHAM; Hanover Street, DUBLIN.

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"STANDARD" CONDENSERS

ADVANTAGES:—

Slow Speed. Large Area for Gas and Water.
Easy access to Interior. Capacity easily increased, &c.

IN USE OR IN COURSE OF CONSTRUCTION:—

	Capacity Cub. Ft. per day.		Capacity Cub. Ft. per day.
GLASGOW	12,000,000	ALDERSHOT	500,000
ANTWERP	2,500,000	RANDERS	500,000
COVENTRY	2,000,000	CETTE	400,000
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BURY	1,000,000	PINNER	250,000
SUTTON	1,000,000	HERNE BAY	250,000
GLOUCESTER	1,000,000	PELTON COLLIERY	250,000
SCARBOROUGH	1,000,000	TUBORG	250,000
GUERNSEY	750,000	AALBORG	250,000

PATENT "STANDARD" WASHER-SCRUBBERS,

See last and next week's Advertisements.

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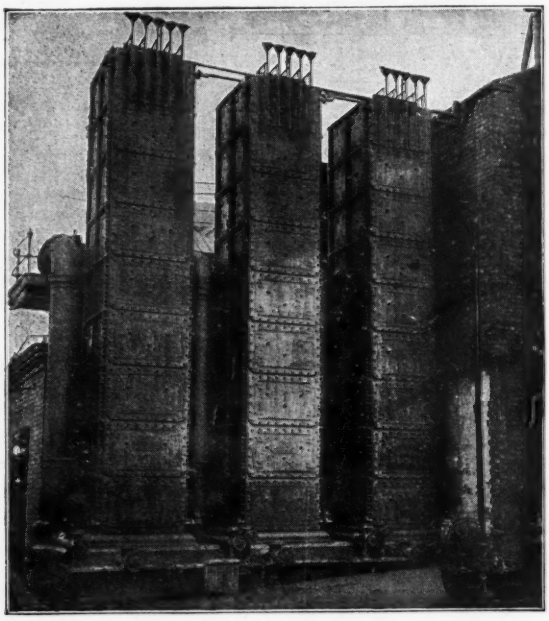

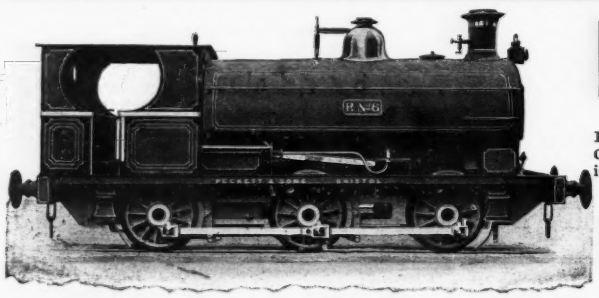

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LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

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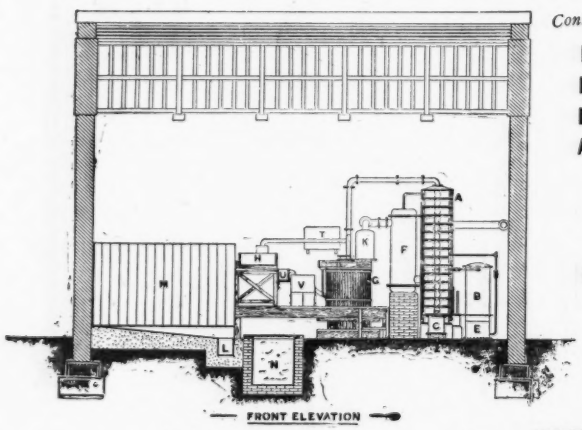
79, MARK LANE, E.C.

WILTON'S SULPHATE OF AMMONIA PLANT.

SIMPLE CONSTRUCTION. EASY MANAGEMENT. HIGHEST EFFICIENCY.

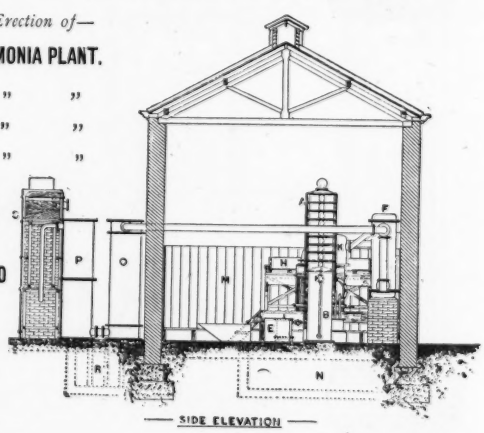


FRONT ELEVATION

Contractors for the Erection of—

NITRATE OF AMMONIA PLANT.
MURIATE OF " "
LIQUID '880 " "
ANHYDROUS " "
TAR DISTILLATION PLANT AND SULPHURIC ACID PLANT.

CYANIDE
PRUSSIATES.
BLUES.



SIDE ELEVATION

REFERENCES.

A. Large Still (Ammonia).
B. Small Still (Lime).
C. Spent Liquor Valve.
E. Limeing Arrangement.
F. Heater.
G. Saturator.
H. Draining Table.
K. Lead Catch Box.
L. Mother Liquor Well.
M. Sulphate Store.
N. Acid Store Tank.
O. Condenser.
P. Scrubber.
R. Settling Tank.
S. Neutralization Plant.
T. Acid Supply Tank.
U. Mother Liquor Trough.
V. Mother Liquor Receiver.

CONVEYORS and ELEVATORS SPECIALLY DESIGNED FOR THE ABOVE PRODUCTS.

Wilton's Patent Neutralizing Apparatus for the Waste Gases from Sulphate of Ammonia Plant.

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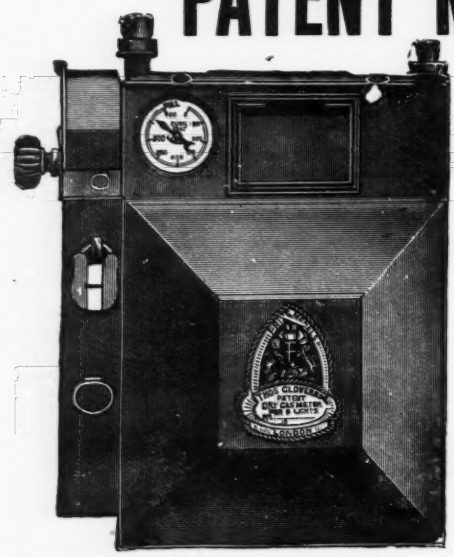

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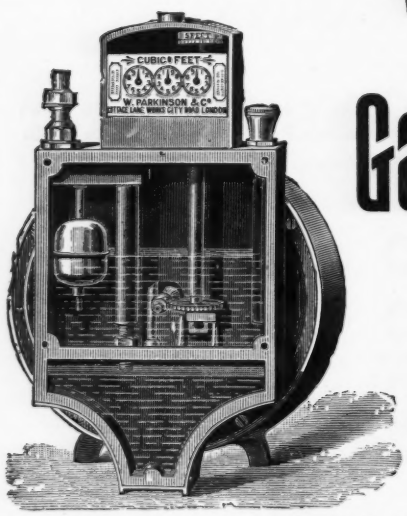

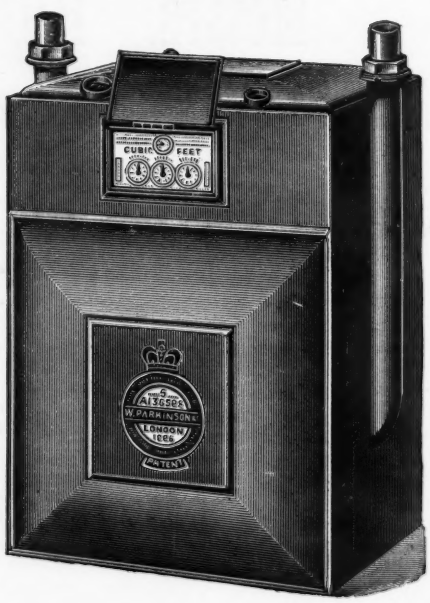

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EDITORIAL NOTES.

Municipalism in Parliament.

MUNICIPALISM reared its head very high in the House of Commons all last week; and its voice was chiefly that of Mr. John Burns. It had to sing small in the end, however, inasmuch as the partisans of unmitigated Municipalism, who had endeavoured to secure acceptance of another new "prin-"ciple," eventually received a severe "setting down" by the majority of Parliament. The play began with the moving of an "Instruction" to the Select Committee on the Tramways Bill of the London County Council, to omit from their consideration the scheme for a tramway crossing Westminster Bridge, and running along the Victoria Embankment to join the debouchure on this thoroughfare of the authorized "shallow subway" line along the Kingsway to Holborn. A more uncalled-for act of vandalism was never contemplated in the history of London government; but the present majority of the London County Council appear to be tramways-struck, and would gladly make a street railway terminus of Palace Yard, if they could. The scheme was defended by Mr. Burns on the remarkable ground that Parliament, having made the London County Council the tramways authority for the Metropolis, ought to stand aside and let the Council have entirely its own way in regard to making and running lines. This is the new "principle" of which mention has been made; and it was brought out again in the course of the later debate on the proposed reappointment of the Joint Committee on Municipal Trading, which was accordingly resisted on the plea that local authorities know best what is good for their districts, and their proceedings ought not to be even inquired into, much less interfered with, by the Parliament that has created them.

It must have taxed to the uttermost the modest assurance of the Socialist members of the House to propose so amazing a development of the rights of municipalities; but it is not likely to be heard of again in a hurry. The leader of the House would not countenance it for a moment; and the breath of sober sense which he breathed over the fevered pretensions of the ultra-municipal faction must have been grateful even to them. All the same, these gentlemen did not like the idea of having their pet plans inquired into, which, as Mr. Balfour remarked, betrayed an extraordinary doubt as to the strength of their own case. They seemed to think that those who "wanted to know, you know," must either be their opponents from the start, or would be made so by what they would learn from the inquiry. This argues, in the words of the Prime Minister, "an extraordinary sus-"picion of the value of the principle" which in the House of Commons the friends of municipal enterprise are so loud in proclaiming. There is an additional weakness of professional municipalizers which hampers their defence very considerably. They first of all amuse themselves by making up out of their own heads a bogey which they proceed to describe as their secret enemy, and then they kill him by the slow torture of their remorseless rhetoric. Thus did Mr. Burns assure the House of Commons that the only objection to municipal trading comes from a few belated individuals, who occupy themselves with opposing the idea because they have nothing better to do; while it is not possible to take up certain "organs" of Progressivism without finding in them some diatribe against the British Electric Traction Company, who are imagined to be the source and inspiration of all the opposition to the propositions of virtuous Progressive politicians. This is obvious nonsense; but it clings to your professional municipalizer like a wet garment, and is quite as burdensome.

Mr. Balfour lifted the debate above the plane where the antiquated Individualists of the Liberty and Property Defence League and the British Electric Traction Company are to be met with, and put the question which most sober citizens of all parties are asking: Is this modern diversion or development of municipal enterprise along commercial lines a good thing or a bad thing for the nation and the communities concerned? On the whole, so far as it has gone, the Prime Minister is inclined to think that it has been for good; but it is necessary to look at the subject from all sides. It is distinctly a feather in our cap that the first thing that strikes Mr. Balfour as needing investigation in connection with trading and manufacturing municipalities is their position as employers of labour on an indefinite scale among their constituents. This is that municipalizing of the dockyarders' voting power which has been deprecated in these columns. There is a greater danger to municipal trading in this quarter than from all the risk of individual corruption to be feared in regard to the heads of a community which is, taken altogether, composed of honest men. Mr. Balfour does not conceal his distaste and contempt for the politics of the dockyarder, and owns that it makes him "look with great suspicion and dislike on any large exten-"sion of employment by the community as a whole."

There are other considerations. Apart from the question of how far the so-called remunerative undertakings of public bodies are really profitable, there is the more sweeping one of how many of them are absolutely sound and removed from all risk of being superseded. Such enterprises as water supply and sewerage must be regarded as proper for municipalization, because whether conducted on a large or a small scale, or profitable on the face of the accounts or the opposite, they cannot be dispensed with. It is different even with gas. Mr. Balfour, while admitting that municipal gas supply has been successful, will not grant that there is any certainty that gas, "even in the near future, will retain "its place as a source of light and heat and power." He was right in drawing attention to this aspect of the gas industry, which has so far given trading municipalities all the profits they have contrived to place to their credit. We who follow the gas industry may believe what we like about it; but we cannot deny that it is a manufacturing industry, and not much more. Consequently, though municipal gas supply has usually shown profits, for the simple reason that the price could be fixed at any desired figure in reason, this does not justify the local authorities who have spent those profits as fast as they came in, with no more thought for the future than the law compelled by saddling them with a sinking fund.

Where Mr. Balfour was more impressive still was in pointing out that tramways are not part of the permanent order of the universe. Speaking broadly, at the present time the whole tramway system of the country is being made over again, at considerably more than the original cost, for electric traction. This means that every penny of the prime cost which has not yet been liquidated is lost. If the tramways sinking funds of those who owned these undertakings in their old form failed to wipe out the entire cost of the original establishment, these provisions were inadequate. Yet who expected the case to arise? And who is to say that any electric tramway now being made will not become obsolete in even less time than the horse tramways? The independent motor is already challenging the supremacy of the tramway; and with a little more improvement it will beat it. Of course, this is the kind of risk which private enterprise has to run, and does run. But, on the other hand, it is a danger to which public money should not be subjected. Where its existence was even suspected, the natural course of custodians of the investment would be to resist improvement at its expense. Will local authorities owning tramways make haste to improve the roads for the use of motors? There is no sinking fund that would be found large enough to protect a municipal undertaking of the speculative kind from this danger, which would disregard dates. Nor would there be much invention were everything municipalized. The individual invents; and, useful as he may be to the human race, he is a pestilent nuisance to the monopolist, who only asks to go on peacefully gathering the profits reserved to him by law.

Sir George Livesey's Cure for Poverty.

Sir George Livesey is famous for "pegging away" at anything to which he sets his hand; and the paper he read on Monday of last week, before the Council of the Charity Organization Society, on "Industrial Partnership and the "Prevention of Distress," is an example of his tirelessness. He is always finding some fresh aspect in which to set his ideals; and he knows very well that unless he keeps these well to the front by his own efforts, nobody else is likely to do it. Sir George Livesey on profit-sharing and workmen directors is a familiar figure of the times. He has constituted himself the apostle of a new dispensation in industrial matters; and he cannot escape from the obligation to go on preaching the word so long as there remain any unconverted. The same thing has to be said over and over again if any lasting impression is to be made. It does not answer for a would-be social reformer to explain himself once and then leave the result to Fate and circumstances. Men's memories are short, and they are too much occupied to do a great deal of hunting up references. Sir George does not allow his contemporaries to forget that there is a remedy, other than the socialistic delusion, for much of the poverty of the poor, by which those who love their fellow-men are justly grieved. Why is there so much poverty in this rich country? Because, in a great measure, of the misdirection and the misapplication of the money that would otherwise prevent it. Those who do not know the working man or his circumstances are so apt to disbelieve the suggestion that whole families of persons of this social class can live well, enjoy themselves reasonably, and provide for the future and for bad times, out of a weekly wage that is no more than they themselves are in the habit of spending upon a little dinner for two. There is no positive sum, in the shape of income, out of which any family might contrive to save; and there is equally no valid reason why the gainer of the humblest livelihood should not put something by against hard times. Taking the English working classes all round, it is probably true that their chief trouble is not being underpaid, but having more money than they know how to properly dispose of. It is so easy to get rid of the superfluity, almost before the possessor realizes that it is there! As a rule, this is when it is lost, without a soul being the better. Nay—instances are plentiful where an extra shilling a week on a man's wages has ruined him. Also, it is notorious that the state of trade in many British industrial centres can be known on any Saturday night by the number of drunken men in the streets. This goes on year after year, without the slightest change. How can an improvement be effected in such a way of living?

Sir George Livesey's remedy is that of saving the man by the reaction of his own savings. He must be helped to make a beginning, because experience amply proves that money will burn in his pocket, if it gets there. Again, all employers of labour know that there is a point beyond which the vast majority of working men will not exert themselves to earn any more money. Bookish students who are in the habit of thinking of the poor as always struggling for dear life, are not aware of the existence of the trouble to get men to earn all the money they might, when employment is brisk and trade is flourishing. Men who could earn £3 a week are content with £2, and give the rest of their time to "playing." What they lack is the sense of responsibility which keeps the man of a higher class harder at work the more he makes by it. Men of this order know that the time to push trade is when it is good; whereas the usual workman does precisely the opposite, and is never so recalcitrant as when he ought to be glad of the chance of getting a little in hand. It is Sir George Livesey's mission to convert these industrial heathens. They can only be reached in one way, and that is not by the pocket, but through the share register. Men who once become proprietors, albeit against their will, do not fall into the ranks of the professional unemployed. What is better still, they are redeemed from the black heresy that no man can add a sovereign to his wealth without somebody else being so much the poorer, which is the root idea of Collectivism. Such men no longer dream of a division of property, but of its creation and increase all round. The phrase "class "war" becomes to them but an empty sound. There are thousands of men who are this already, and more—thanks to Sir George Livesey; and it is not his fault if the number is not larger.

The Transmission of Power by Gas.

It scarcely seems appropriate that such a subject as the transmission of power by gas should be taken possession of by a Society composed, according to the title, of Electrical Engineers. One would as soon expect to find a gathering of gas engineers concerning themselves with the synchronizing of alternators. Gas engineers ever were modest folk, however, and they used to be looked down upon as fumblers of no account in the presence of their betters—the professors of various sorts whom a paternal Government and certain grandmotherly local authorities employ to look after their methods and morals. It would hardly occur to them that their opinions upon an electrical technicality could be worth much; and they would certainly never think of meeting in order to exchange their views respecting such a matter. Not so the members of the Birmingham Local Section of the Institution of Electrical Engineers, who assembled recently to hear Professor Burstall read a paper on the distinctly gaseous topic named. Still, one lives and learns; and it matters not whence knowledge proceeds, if it is worth something. Gas engineers of all men would be the last to deny the possibility of lookers-on occasionally seeing more of their game than the players, whose attention is commonly absorbed by what is immediately in hand. During the last few years, the presumption has been advanced that there is room for a kind of gas industry differing essentially from that which originated and still finds its mainstay in lighting. Gas engineers, who ought to know a little more than outsiders of the history of their craft, are aware that there is nothing new in this suggestion. The idea of there being a prospect of making money in the manufacture and distribution of fuel gas not suitable for lighting, if not as old as the hills, at least dates from early Victorian times in England, and had a revival towards the end of the past century in the United States. It has always and everywhere been a commercial failure.

Latterly, a new fact has appeared, which has served to start speculation once more on the old road; and this is the large gas-engine. This distinct variety of the internal combustion prime-mover—for it is this, and not merely an enlargement of the gas-engine as known up to 1900—not only furnishes a means of utilizing specially manufactured fuel gas for the direct generation of mechanical power, but it actually depends upon such supply. It would take too long to explain this point; but the fact is as stated. Working backwards, it has been found also that in certain circumstances it answers to make engine gas specially, instead of using ordinary strong town's gas for the purpose. Hereupon the question has been put—notably in the most practical form by the South Staffordshire Mond Gas enterprise—as to whether there is an economic opening in a selected locality for the distribution from a generating centre of fuel gas already known to be a success in the mechanical sense. This question remains to be answered. Meanwhile, Professor Burstall has taken an opportunity for airing his views on the subject; and an abstract of his paper, with notes of the discussion, will be found in another column.

We desire to confess at once that all subjects are treated in the "Journal" from the standpoint of the common, statutory gas interest; and such a topic as this would naturally be regarded by a gas engineer with some jealousy, as conveying an imputation upon the competency of his kind of gas undertaking to meet all the legitimate and mutually profitable demands of the public within its area of operation. It must be admitted that such large gas-engines as those viewed by the Birmingham electrical engineers as a preparation for Professor Burstall's discourse, are not customers for town's gas. How far they are necessary, and how many of them will be found in a given locality, is another matter. The immediate question is, whether it will be to the advantage of the user of such engines—assuming their desirability—to make his own gas for them on the spot, or buy it distributed at a price which will return a profit to the seller. Professor Burstall did not throw any real light upon this problem. It may at once be conceded that the engineering of fuel gas manufacture and distribution in bulk is not devoid of difficulty; but it is not absolutely impracticable. Such matters as the kind of joint to be adopted for the gas-mains, and the best pressure for distribution, are details. The old talk about the solution of the smoke problem by the substitution of gaseous fuel for coal is also beside the mark. It is one thing to demonstrate how much fuel gas

a particular main will deliver at a given pressure, and it is quite another to satisfy curiosity upon the different problem of the price at which this could be sold. It all comes back to the question of which is the cheapest fuel for work to be done; and the Birmingham paper did not touch this point. Mr. Henry Lea, who presided at the meeting, found out the weak spot; and Professor Threlfall acknowledged its existence. It is a curious truth that neither the engineering nor the economics of the subject appears to have advanced a jot beyond the matters given in evidence on the South Staffordshire Mond Gas Bill when in Committee; so that both problems stand precisely as they did at that period.

The Walker and Wallsend Company's Parliamentary Success.

TECHNICAL interest in parliamentary doings last week was limited to the fortunate experience of the Walker and Wallsend Gas Company, who succeeded in maintaining their cause in face of a very formidable opposition on the part of the Corporation of Newcastle-upon-Tyne. The Company have two Bills this session—one being for the transfer of their very interesting electric power branch to the Newcastle-upon-Tyne Electric Supply Company, with whom they had a working agreement. The industrial arrangements of this national workshop—for such is the whole region round about "coaly Tyne"—are of a highly specialized character, and therefore cannot be discussed in a general way. There is, however, one respect in which Tyneside does not differ from the rest of the country; and that is in requiring all the gas it needs of the most suitable quality at a reasonable price. They do not seem to be particularly enamoured of the "principle" of Municipalization in these parts—being more concerned with the price than with the method of public supplies. The Walker and Wallsend Gas Company prudently met most of their local opponents on points of difference, and accordingly got rid of much threatened opposition. They accepted the usual reduction of the amount of fresh capital asked for; this being a time-honoured comedy in which promoters and petitioners are never tired of playing their traditional parts. But it is rather a pity that objection was taken to the proposed renewals fund, for reasons which were stated at some length in these columns last week, and therefore need not now be repeated. On the subject of the illuminating power of the gas, the Company's proposal to come down from 15½ to 14 candles, and give up a penny of the standard price—from 3s. 3d. to 3s. 2d. per 1000 cubic feet—was happily accepted. This is a further step in the direction of getting rid of artificial requirements in gas manufacture, from which nothing but good can ensue for the public. As a matter of fact, the Company will now probably go on supplying gas of about 15-candle power from the good gas coal at their command; but they will be relieved from the fear of incurring a penalty if, in the course of endeavouring to get the best results out of his raw material, the Manager should ever happen to fall fractionally below an arbitrary standard which has lost all the meaning it ever had.

The Company have succeeded in obtaining liberty to offer discounts up to 25 per cent. on the ordinary price of gas to large consumers. This is a wonderful piece of liberality on the part of the official guides of Select Committees on Gas Bills; and the Company must rest content therewith, for the time being. Seeing that their actual selling price is 2s. 6d. per 1000 cubic feet, it certainly appears that a cut to 1s. 10½d. for power or large fuel supplies might enable them to secure a good deal of trade in these branches that would otherwise be lost to them. There is everything in satisfying the customer; but the point is that this has to be done. It is of no use to tell him that he ought to be satisfied if he is not; yet this is the besetting weakness of those who happen to have the trade in their hands for the moment. It would be curious to learn precisely upon what grounds the Board of Trade act in restraining gas companies' special discounts to 25 per cent., while electricity supply undertakers under their advisers' very noses think nothing of making bids of 75 per cent. off for power connections. The Walker and Wallsend Company are to be congratulated upon securing what appears to be a clear precedent in the matter of power to purchase the lands which they now hold on lease, and the additional land required to extend the works, from the Newcastle Corporation. It is extremely gratifying, more especially at this time of day, to find Parliament treating a gas-works as being of such public utility and necessity as to warrant the grant of compulsory powers of site enfranchisement which are by no means lightly bestowed.

Welsbach Reconstruction.

Notwithstanding the desire of the Welsbach Board that their scheme of reconstruction should be first presented to the stock and share holders before it was made public property, some of the financial and other daily papers have been making forecasts which have a plausible appearance, but which, not being marked by official authority, must not yet be taken as altogether trustworthy. It is suggested that the scheme will propose the creation of new (cumulative) preference and ordinary £1 shares, in lieu of the present stock. For each £100 of preference stock, the holders will be offered £42 of the preference shares and £22 of new ordinary shares, or together £64. To the ordinary stock holders £24 for every £100 they now hold will be tendered. To the deferred shareholders will be offered a small amount—possibly 1s. in the pound—of new deferred shares for their present holdings. If this sketch of the scheme is substantially correct, then, according to the present market value of the shares and the prospects of the concern with its present capital, the different classes of holders will in the circumstances do well. But the proposals—assuming them to be true in the main—will mean a total reduction in the existing monstrous capital of well above 2 millions, which, though a grievous thing to have to say, is none too much. However, whether this outline of the scheme is accurate or not, the Directors, it is common knowledge, have been working hard at it for many months past; and not only at that, but in other respects as well. Some of them have been travelling frequently and far from home lately in the interests of the shareholders, with what result the shareholders will be made aware, we anticipate, either in the forthcoming report or at the annual general meeting, which will probably be held in a few weeks time. Meanwhile, the further prediction is made with regard to the profits that have been accumulating during the past two years, that the Directors will recommend that they shall be absorbed in the business. Their one idea at the present time is to so strengthen the concern financially in the present that it shall redound to the advantage of the future. The policy is a sound one, and the only one that can rehabilitate in public confidence the greatly depreciated proprietary interests. Remembering the past and looking to the present, and knowing what might have been under different circumstances, it is hard to repress a feeling of sorrow for the over-confiding shareholders of but a few years since.

The Supremacy of Incandescent Gas Lighting.

The editorial article that appeared under the above heading in the "JOURNAL" last week has brought to us a paragraph taken from the "South-Western Star," and written by a facetious member of the staff. But cleared of its witticisms, the paragraph bears independent testimony to the superior efficiency of incandescent gas lighting in comparison with electric arc lighting. It seems that, close by the line across St. John's Hill where the boroughs of Battersea and Wandsworth meet, there are to be seen two lamps. One stands in the "borough of progress"—that is to say, the Borough of Battersea. It is a tall electric arc lamp, which cabmen and others avoid, because, in spite of its pretentiousness, the standard is a very fragile thing, and in divers parts of the borough similar standards have been known to collapse on being grazed by a cab wheel. However, the arc lamp at the head of the "triumphal column" does its best, and gives an amount of light "which is certainly appreciable." If there were nothing in the neighbourhood to challenge comparison, the Battersea municipal illuminant might be considered by those who did not know better to be the best in existence. But the Wandsworth Council have put up a new incandescent gas-lamp in proximity to it; and this is what the jocose writer of the "South-Western Star" says about it: "The thing that needs explaining is that this particular gas-lamp gives a much more brilliant and steady light than the electric one belonging to the opposition borough across the road. One may well ask how can these things be, and why are they permitted? We have a suspicion,

too—Wandsworth being parsimonious as well as backward—that the cost of the superior gas lighting is very much less per lamp than Battersea pays. We do not mind this. Greater efficiency with less expenditure may appeal to vulgar minds of the thrifty, cheeseparing sort. Battersea is wisely liberal, preferring progress to either retrenchment or efficiency." Of course, this is only the humorous writer's way of putting things; but his points are clear, that the new gas-lamp gives a superior light and costs less than the electric arc. There is one matter upon which we must correct him from our own knowledge, and that is as to the parsimony and backwardness of the Wandsworth Council—at all events, so far as lighting goes. For some considerable time, the Council have been lighting their streets by incandescent gas-lamps; and the former authority in the Putney parish were certainly among the first of the local bodies of London to adopt incandescent gas lighting on a large scale—the installation being one in which we well remember Mr. H. H. Jones took a lively interest. We learn from the Secretary of the Wandsworth and Putney Gas Company (Mr. C. W. Braine) that the new gas-lamp which has provoked this little piece of journalistic pleasantry in our suburban contemporary is of the Scott-Snell type.

Gas Companies and Light Railway Inquiries.

The trouble and expense to which gas companies may be put in endeavouring to obtain protection against injury to, or interference with, their property, in consequence of the construction of tramway or light railway lines, are strikingly shown in the article under the above heading which appears in another part of the "JOURNAL." Here is an instance of schemes being projected which rendered it necessary for the Torquay Gas Company to incur considerable outlay in connection with two inquiries before the Light Railway Commissioners, in order to prevent a portion of their mains being rendered inaccessible through the execution of the proposed works. After making due preparation for presenting their case, they learnt on the eve of the first inquiry that the promoters did not intend to go on; and on the occasion of the second the Order applied for was refused. It seems from the particulars contained in the article that anybody can approach the Commissioners and procure an inquiry without being required to give any guarantee as to their *bona fides*, or any assurance that the inhabitants generally desire the proposed railway, and that the parties whose rights will be interfered with have been consulted on the matter. In the case under consideration, we understand that the Company were never asked as to the position of their mains, nor were their officers approached to talk over the suggested arrangements. It appears that there are rumours of another application being made to the Commissioners; so that all the old trouble and anxiety will have to be borne over again. The worst of it is that the Commissioners have no power to grant the opponents their costs in case the promoters fail to make out their case; and as the proceedings are not officially reported, they have not even the poor satisfaction of knowing that their objections are placed on record.

Capital and Labour

In the last issue of the "JOURNAL," we had the pleasure of noticing briefly the proceedings at the distribution to the men of the bonuses accruing to them under the profit-sharing scheme which Messrs. Willey and Co., of Exeter, have inaugurated. Unfortunately, the head of the firm (Mr. H. A. Willey) was prevented by illness from being present on the occasion; but a plain, straightforward letter from him was read, which the men will do well to take carefully to heart. The arrangement, under which the men receive a proportion of the profits made by the firm (not, however, to exceed in any one year the handsome amount of 6 per cent. on their wages), is on trial for three years; and it rests entirely with the employees to secure its renewal after this period has expired. In other words, the men have got to earn the addition to their wages. To do this, however, it is merely necessary for them to realize that the interests of their employers are also their own. But that is just what it is so often difficult—and sometimes apparently impossible—to get working men to understand. Profit-sharing, where tried, has not proved uniformly successful; and reading between the lines of Mr. Willey's letter, it is to be feared that he has not so far found the result to be quite all that he expected. This view, of course, may be an entirely mistaken one; and we shall be pleased for two reasons if such is the case. First, because from profit-sharing generally as a means of drawing master and man closer together we have expected much; and, secondly, because Mr. Willey is untiring in his efforts to promote the welfare of his men and of the city in which the business of the firm is established, and so has the very fullest possible claim to faithful service.

In Conference.

As has been remarked, Mr. Willey has at heart the well-being of the working men of Exeter generally, as well as that of his own employees; and an instance of this occurred last Saturday week, when members of the Friendly Societies and Labour Associations of the district were entertained by him, to the number of about 1500. It is to be regretted that on this occasion also Mr. Willey's indisposition prevented him from being present at the gathering; but his place was taken by his brother, Mr. S. Willey, and a very pleasant and profitable evening was spent—the business portion of the proceedings (the discussion of trade and labour questions) being followed by an excellent concert. After the reading of a communication from Mr. Willey, in which he urged the necessity for old-age pensions, an interesting address on the trade of Exeter was given by the Sheriff of the city (Mr. W. R. Mallett), who pointed out that it was no light task for their manufacturers and merchants to compete successfully with other places which are in many respects more favourably situated. To enable the wholesale trade of Exeter to be retained and increased, it was, he said, necessary for the local governing bodies to adopt a considerate policy, for the masters to keep themselves thoroughly up-to-date, and for the working men to render just and faithful service and avail themselves of the great educational facilities which they possessed in the city. This excellent advice was greatly emphasized by figures quoted by Mr. Mallett with regard to the expansion of trade during the last twenty years at Exeter, Bristol, and Plymouth, which were greatly in favour of the two last-named places. It will be the citizens' own faults if they do not profit by the facts which Mr. Willey has been public-spirited enough to take steps to bring before them. He has led the horse to the stream.

Municipal Trading, alias Socialism.

To the arguments adduced against municipal trading there is no end; and the flood of criticism which has lately been poured upon this mischievous movement would have been enough to have utterly extinguished many a very much better cause. The latest indictment of the system is contained in a pamphlet bearing the above title, written by Mr. J. Ratcliffe Cousins, of the London County Council, and published by the London Municipal Society. The price at which it is issued (one penny) is so modest as to place it within the reach of even the most grievously overburdened taxpayer; and inasmuch as it contains matter deserving of the most serious reflection, we would commend it to all whom it may concern—that is, everybody. Mr. Cousins thinks that town councillors are won over to municipal trading by two considerations—the promise of resultant profits and of added individual importance. Vanity plays a great part in the world's affairs; but we are inclined to think that the possibility of making a profit exercises a still greater influence in this case. This is apparently also the opinion held by the author, for he asks: "Where is the dazzling profit?" and he proceeds, after exhibiting the failings of municipal electric light undertakings in this respect, to discuss the table of rating statistics last issued by Mr. Carter, of Preston, and to give a list of the corporation gas-works which showed a loss for the year 1901-2. Then we have an example of the truth of the saying that "comparisons are odious" (to Manchester), in the statement that the Liverpool Gas Company supply gas of better quality at a cheaper rate than the Manchester Corporation, though they have to pay more for their coal. Mr. Cousins remarks that it has been proved beyond dispute that the propelling force of the municipal trading movement is Socialism; and to the councillor who is anxious not to further this dangerous innovation, he commends the following alternative policy: "To limit the direct employment of labour by the municipality as much as possible to work in connection with the performance of its sanitary and other proper functions; and

wherever in the interests of the public it is thought advisable to protect them against the improper use of monopolies, to find the true remedy in public control rather than in public ownership and management." This should form quite an ambitious enough programme for the average town councillor.

Dual Powers of Supply.

The hard case of the Yorktown and Blackwater Gas Company has once more been brought forward in the course of an inquiry before the Board of Trade into an application by the Aldershot Gas and Water Company for a Provisional Order. The latter Company are desirous of raising further capital for the purpose of extending their works; and the Yorktown Company ask that they shall be prohibited from using any portion of such capital for starting a competing gas supply within a certain area over which both Companies have rights, but which hitherto has been supplied solely by the Yorktown Company. The position, which is a curious one, was fully explained in the course of the inquiry (a report of which appears on another page), as well as in 1901, when a proposal made by the Aldershot Company that they should be authorized to purchase the Yorktown undertaking was, owing to opposition on the part of the Aldershot District Council, negatived by the House of Lords. It is greatly to be regretted that the purchase was not allowed; for, as Mr. Pelham, the representative of the Board of Trade, remarked, this would be the simplest way out of the difficulty. It was urged on behalf of the Yorktown Company that the Board have power to limit the use of the capital desired by the Aldershot Company so as to render competition impossible; and it will be interesting to learn the decision that may be come to on the point. No dissatisfaction is expressed with the way in which the Yorktown Company carry on their work; and though it is twenty-six years since the North Camp Company (afterwards bought up by the Aldershot Company) obtained powers of supply over the area in question, no steps have been taken to carry their powers into effect. On these grounds alone, they had good reason for believing they would never be called upon to face the competition which now threatens them; and it is to be hoped that they may not after all have to undergo the hardship which such competition would constitute.

The "Journal" Volumes.—To meet the convenience of subscribers, it has been decided to divide, in future, the numbers of the "JOURNAL" into quarterly volumes, instead of half-yearly as hitherto, and to issue quarterly indices. The index for the first three months of 1903 is published with this "JOURNAL."

The Twentieth Annual Informal Meeting of Gas Managers is announced to take place at the Alexandra Hotel, Glasgow, on Tuesday next, the 14th inst. The President (Mr. W. B. M'Lusky, of Perth) will deliver an address; and questions affecting the gas industry will, as usual, be submitted for discussion.

German Association of Gas and Water Engineers.—A preliminary announcement has been made that the forty-third annual general meeting of this Association will be held at Zürich, from the 23rd to the 25th of June next, under the presidency of Herr Beer, the Manager of the Berlin Municipal Water-Works. The programme of the meeting, to which visitors will, as usual, be welcomed, will be issued later.

Self-Instruction for Students in Gas Manufacture.—The series of articles under the above title which have been appearing in the "Gas World" have been reprinted in book form. The instruction is conveyed in a series of 131 questions, based upon the Ordinary Grade syllabus in "Gas Manufacture" of the City and Guilds of London Institute; and full answers are given to them, with the addition of diagrams. The author (a gas engineer and chemist) does not desire to assist in anything in the nature of "cramming;" and therefore he advises the student to read up the subject in the standard treatises before attempting to answer any of the questions.

Municipalization in Italy.—In the "JOURNAL" for Jan. 6 last, an article was devoted to a description and criticism of the Bill that had been introduced into the Italian Chamber of Deputies for the permissive municipalization of the public services. It will be remembered that the Bill, before it left the Chamber, underwent some amendment favourable to the Companies carrying on their operations in the country. In the course of a letter received from Mr. Arthur F. Phillips, M.Inst.C.E., he mentions that the Bill has now become law; it having been approved in the Senate by a majority of eighteen votes. A number of amendments were proposed; but the Bill was finally carried, without further modification, in the form in which it left the Chamber of Deputies. The only (but great) consolation the Companies have whose operations are centred in Italy, is that the conditions of the measure are a great improvement on those which were first proposed.

WATER AFFAIRS.

The Metropolitan Water Board at Work.

THE representative body constituted by the Metropolis Water Act, 1902, to acquire the undertakings of the London Water Companies and control the supply, met for the first time last Thursday, in obedience to the order issued by the Local Government Board under the provisions of the Act. They made a good start by deciding to admit representatives of the Press; and the result was that more or less lengthy reports of the proceedings appeared next morning. As the new body has been entrusted with the management of a business in which every inhabitant of the Metropolis is more or less interested, it is of the highest importance that their doings should be open to public scrutiny through the medium of what are euphuistically called the "usual channels" of information." After the preliminary business had been disposed of, Sir J. T. Ritchie was selected to preside over the deliberations of the Board, pending the appointment of a permanent Chairman and Vice-Chairman; and it was the question of whether or not salaries should be attached to these offices which gave rise to the first discussion. The case for non-payment was well put by Mr. W. H. Dickinson, who for some time was Chairman of the Water Committee of the London Council, and has been Chairman of the Council itself; and he cited that body, as well as some others, in support of his contention. He would, of course, be prepared to accept the office on the condition he named; for he is reported to be one of four members of the Council who are competing for it. On the other hand, Lieut.-Col. Colvile urged that the Board ought not to ask anyone to undertake the chairmanship without adequate remuneration; and he proposed first of all that the salary should be £2000 per annum, and subsequently amended his proposition by omitting the amount.

As was evident from the discussion, there is something to be said on both sides of this, as of every other question. The gentleman selected to direct the proceedings of the Board should possess the qualities of impartiality, business capacity, and tact. Moreover, he should be able to devote a large portion of his time to his duties—at all events, for the first year or two. If, in addition, he had some technical knowledge of water supply, it would be of advantage. We do not doubt but that it would be possible to find someone willing to take the position merely for the honour of being the head of an important public undertaking. But a man of high social standing, to whom £2000 a year, or any other salary, would be of little or no importance, and who might covet the office for the opportunity it would afford him of gaining a certain amount of *kudos*, might turn out to be little better than the "gilt-edged duffer" alluded to by Mr. John Burns in the course of the discussion. Even supposing he were thoroughly capable, he might grow tired of the tax upon his time, and relinquish the duties. If the Board require for their Chairman a gentleman combining administrative capacity with special technical knowledge, it is doubtful whether the salary suggested would be sufficient to attract the most suitable man; for it would scarcely pay anyone in full professional practice—and it must be somebody who is well abreast of the times, and not on the eve of retirement—to give it up under the conditions named. The question is a very difficult one, and therefore the Board acted discreetly in not coming to any conclusion upon it without further consideration.

The first meeting was not, however, barren of result, for a Committee was appointed to make arrangements for conducting the business and securing the services of the chief officials. After all, whoever may be appointed Chairman and Vice-Chairman, it will be the Clerk, Solicitor, Financial Adviser, and Engineer who will have to bear the largest share of the responsible work of the Board; and the selection of these gentlemen will need the utmost care. It is to be regretted that the constitution of the Committee gave rise to the first unpleasant incident in the proceedings of the Board; a charge being brought forward that the Progressives had been neglected. Some changes were, however, made, which appeared to give satisfaction to the discontented members. Thus, at the very outset, the "party" question was introduced. This was most unfortunate, because on such a body as the Board party spirit should have no place. All the members should strive to do their best in

the interests of the public. They have been entrusted with the control of the water supply of the Metropolis because it was thought that they would do the work better than the Water Companies. This is their mission; and they will be well advised to set about fulfilling it, and not waste time in squabbling over "party" questions.

Meeting of the East London Water Company.

It was to be regretted that, having to attend to his parliamentary duties, Colonel Lockwood, the Chairman of the East London Water Company, was unable to preside at the half-yearly meeting on Thursday. He, however, had prepared a full statement of the Company's affairs, which Mr. G. Banbury, who occupied the chair in his stead, read to the proprietors. It opened with an acknowledgment that the figures in the accounts for the six months ending in December last were not all that could be wished. Weather and trade had affected the Company's business; and these were matters over which, of course, the Directors had no control. The expenditure was £8000 more than in the second half of 1901; but £7000 of it was accounted for by the increased rates and taxes—another matter which the Board were quite powerless to influence. The cessation of the war brought slackness of trade, which had an effect on the Company's supplies by meter; while the weather, without being very wet, was rainy enough to obviate the necessity for watering the roads. Consequently, there was an increase of only £2608 in the water-rates in the past half year, whereas in the corresponding period of 1901 it amounted to £12,400. However, all things considered, the Company's business is progressing in a perfectly satisfactory way; and the Directors were in a position to pay a dividend at the rate of 8 per cent. per annum. In one important respect they have maintained the Company's prestige. Many years ago they initiated the system of constant supply as an entirely voluntary act; and in order that there should be no interruption in it, they have spent upwards of £50,000 during the past eighteen months in the purchase of water from other Companies. This large outlay was not incurred in order to procure what, under the terms of the Metropolis Water Act of 1899, would be called "emergency water," but solely for the purpose of ensuring the constant supply. And yet the Company have in the past come in for more abuse than probably any of the other London Companies. However, the Directors have the satisfaction of knowing that they and their officers have done their duty to the consumers, and have kept up the efficiency of the works and plant. They naturally experience regret that the undertaking over which they have watched will soon pass out of their hands; but they will find a certain amount of consolation in the reflection that they will be handing over to its new owners a thoroughly good going concern. It will remain for these to make the best possible use of it.

PERSONAL.

Mr. James M'Gilchrist, Gas Engineer, of Dumbarton, has been returned unopposed for a third term as a member of the Dumbarton School Board. He has filled the office of Convener of the Property Committee.

Mr. Thomas Watson, who has been in the employment of the Corporation of Kilmarnock for the past twelve years, has been appointed Gas Manager of the Midleton works, near Cork. He started his new duties yesterday. On Saturday, the 28th ult., he was presented by his fellow workmen with a handsome writing desk, a travelling bag, a case of forks and knives, a fountain pen, and various other useful articles, as tokens of the respect and the high esteem in which he is held throughout the works. Mr. W. Fairweather, the Manager, occupied the chair.

OBITUARY.

At Santa Margherita, Italy, the death occurred a few days ago, in his 85th year, of Dr. E. Chesshire, F.R.C.S., who was for the greater part of his long life one of the best-known ophthalmic surgeons in the Midland counties, and for forty years held the position of Senior Surgeon to the Birmingham Eye Hospital. The close of his long and useful life calls for notice here from the fact that he took a very keen interest in the subject of water supply, and several letters from him appeared in our columns. He was a shareholder in some of the London Water Companies, and occasionally spoke at their meetings—his views being opposed to the municipalization of their undertakings. He was a member of the Society of Medical Officers of Health.

ESSAYS AND REVIEWS.

THE TRUTH ABOUT ILLUMINATING POWER.

[Second Article.*]

In order to explain how Mr. Dibdin, in the table we have been noticing, arrives at the value which he terms the "true" illuminating power of a gas, it is necessary to refer to the late Dr. Pole's "Notes on the Theory of Gas-Burners," which were published in the "Journal" in 1870 (Vol. XIX., pp. 778 and 813). In the course of these articles, the talented author said: "There are many elements entering into the action of a gas-burner, among which the following are probably the most important: The specific gravity of the gas; its illuminating power; the pressure which causes the issue of the gas; the quantity of gas issuing in a given time; the dimensions of the flame; the quantity and intensity of the light produced; and the construction and dimensions of the burner employed." He then pointed out that some kind of relations ought to exist between these various elements, and proceeded to investigate one "small yet very important point"—namely, "the relation between the quantity of gas consumed in a given burner and the light produced thereby." The result of his investigation was to establish the law which is now spoken of as "Pole's Law," and is as follows: "That during the normal state of action of a gas-burner, the light given varies directly as the consumption, *minus* a constant quantity." Representing this by c, then, if the consumption is q cubic feet per hour, and the light afforded is L candles, the law is expressed thus—

$$L \propto (q - c) \text{ or } L \text{ varies as } (q - c)$$

and therefore $L = A\ (q - c)$, where A and c are constants for the same gas and the same burner.

After demonstrating the general applicability of this law, Dr. Pole went on to say that, assuming it to be a correct expression of the relation referred to, the next step towards making it practically useful would be to investigate, by careful and systematic experiments, how the constants in the formula are affected by the circumstances of the combustion, such as the quality of the gas, the pressure, the nature and dimensions of the burner, the use of the chimney, and so on. Finally, he concluded his articles with the words: "If these points (including the normal range of the burners) were determined, and the new formula were properly adapted to them, it would probably furnish a means of testing the economical and photometric values of different varieties of gas burners far more completely and satisfactorily than by the vague estimations hitherto applied."

Dr. Pole takes us thus far. His law was an expression of the relation between the quantity of gas consumed in a given burner and the light produced thereby; and he foresaw that it would probably furnish a means of testing the economical and photometric values of different varieties of gas-burners. He did not indicate that it would be of service in ascertaining the illuminating power of a gas, though he suggested that, among other points, the effect of variations in the quality of the gas on the constants in the formula should be investigated.

Next, Messrs. Heisch and Hartley, in 1884, proposed to compute from values for the constants A and c, determined from photometric observations made at other rates of consumption, the "power" of the gas at the 5 cubic feet per hour rate. The "power" so found obviously would differ from values calculated for the illuminating power of the gas on the assumption that the light afforded by a burner varied directly as the consumption. Messrs. Heisch and Hartley pointed out that many rich gases could not be burnt in ordinary burners at the hourly rate named, and that the customary mode of calculating the illuminating power of the gas (at that rate) by direct proportion from results obtained by observations at lower rates, was inconsistent with Pole's law and their own deductions. They then proposed that gases of all qualities should be tested in one universal testing burner—viz., Sugg's "London" argand—at convenient rates of consumption, and that from the results of these testings the values of A and c should be deduced. The "probable" value of the gas for the rate of 5 cubic feet per hour could then be inferred by applying these constants in Pole's formula. Mr. Dibdin now proposes, so far as we understand him, to deduce this "probable" value for the gas under examination, and to designate it the true illuminating power of the gas when tested in the particular burner. He would not necessarily use only the "London" argand burner in testing gas. His table enables the tester to compute this probable value—otherwise true illuminating power—of the gas in less time than by ordinary calculation, provided the tester has mastered the mode of using the table.

The procedure may be appropriately explained by the aid of the example quoted at the head of the table, which is as follows: "To find A, divide the difference between any two observed illuminating values within the range of the burner by the difference between the observed consumptions. To find c, divide any observed illuminating values by A, and deduct the dividend from

* The first article appeared in the "Journal" last week (p. 818).

the observed consumption for that illuminating value. The following example shows this method of working:—

		Differences.
Observed consumptions corrected for temperature and barometric pressure	4·8	4·4 . 0·4
Observed illuminating values	16·0	14·0 . 2·0

Therefore $2{\cdot}0 \div 0{\cdot}4 = 5{\cdot}0 = A.$
and $16{\cdot}0 \div 5{\cdot}0 = 3{\cdot}2,$
and $4{\cdot}8 - 3{\cdot}2 = 1{\cdot}6 = c$
Then $L = A\,(q - c) \therefore L = 5{\cdot}0\,(5{\cdot}0 - 1{\cdot}6)$
$= 5{\cdot}0 \times 3{\cdot}4 = 17$-candle power."

This illustration concludes with the statement that by the use of the table the above calculations are rendered unnecessary. Let us explain precisely what the saving in calculation appears to be. The correction of the observed consumptions for temperature and pressure is done without the aid of the table in any case; and the difference between the two rates of consumption has to be ascertained without the table. Then the formula may be applied to, *e.g.*, the foregoing example thus—

$$L = A\,(q - c)$$

$$L = \frac{2{\cdot}0}{0{\cdot}4}\left[5 - \left(4{\cdot}8 - \frac{16{\cdot}0 \times 0{\cdot}4}{2{\cdot}0}\right)\right]$$

It is the solution of this equation that the table gives by simply finding on it the positions of the three values 0·4, 16·0, and 4·8; bringing the first, which is inscribed on a rotating pointer, opposite the second, and observing the figure at the point where the column then headed by the third value meets the curve on which the second value lies. The result can thus be found quickly; but failing the possession of one of Mr. Dibdin's tables, we think anyone accustomed to use the slide-rule for multiplication and division would get out the result in little more time. If a very large number of the equations had to be solved, the table would save an appreciable amount of time; but the corrections for temperature and pressure would be made most readily by the aid of the slide-rule; and it would hardly be worth while, for solving a few equations, to lay down the rule and take up the table. The size of the table is nearly 30 by 22 inches, so that it is really only suitable for hanging on a wall. In such a position, in a photometer-room, it would doubtless be very useful, if the method of computing the "true" illuminating power of a gas advocated by Mr. Dibdin ever came into vogue.

REPAYMENT OF GAS AND WATER LOANS.

Our readers may remember that early last year a Select Committee of the House of Commons was appointed to inquire and report as to the statutory and other conditions limiting the periods for repayment of loans raised by local authorities in England and Wales, whether any relaxation of such conditions was desirable, and whether uniformity of practice could be secured in this matter. Subsequently the Committee were instructed to extend the scope of their inquiry to all parts of the United Kingdom. The Committee's report (dated June 24) was issued in July, and concluded with a series of ten recommendations. The first was that the maximum period for the repayment of loans under the Municipal Corporations Act, 1882, the Local Government Act, 1888, and the Municipal Corporations (Ireland) Act, 1843, should be extended to 60 years. The others were to the effect that the sanctioning authority should be empowered to fix the method of repayment in all cases, and to provide for the establishment of a repairs fund where necessary; that Private Bill Committees should, except where they undertake detailed inquiry, leave the fixing of the exact periods for repayment to a Government Department; and that five years should be the ordinary maximum period for the repayment of loans for defraying the cost of promoting Private Bills. The minutes of evidence taken by the Committee have just been published; and, with the 34 appendices, they form a rather bulky Blue Book. The first appendix is of special interest to our readers, as it contains a list, prepared by Mr. Noel T. Kershaw, one of the Assistant-Secretaries of the Local Government Board, of the principal objects for which the Board sanction loans, with the periods usually allowed for repayment. We take therefrom the following figures:—

Gas Supply.

	Years.
Purchase of undertaking	up to 30
Plant—	
Gasholders, tanks, hydraulic mains, condensers, scrubbers, mains, governors, coke-stage, and tar-well	,, 30
Purifiers (boxes and covers), exhausters, station meters, and washers	,, 20
Sulphate plant, benches, photometer, and testing appliances	,, 15
Stoking machinery, meters, cooking-stoves (for hire), lamps and columns, and working capital	,, 10
Retorts	,, 2
Street lighting—	
Lamps and pillars of all kinds	,, 10
Incandescent gas-burners and fittings	,, 5

Water Supply.

	Years.
Purchase of undertaking	up to 30
Plant—	
Mains and pipes, reservoirs, and water towers	,, 30
Waste-water meters	,, 10
Experimental works (boring)	,, 5*

Mr. Kershaw's paper contains the following example of an equated period for a loan for gas-works purposes:—

Description of Work.	Estimated Cost.		Usual Term of Years Allowed for Repayment.		
Buildings	£2500	×	30	=	£75,000
Mains	1245	×	30	=	37,350
Gasholders	1500	×	30	=	45,000
Condensers	530	×	30	=	15,900
Purifiers	1000	×	20	=	20,000
Benches	1200	×	15	=	18,000
Meters	530	×	10	=	5,300
Retorts	600	×	2	=	1,200
	£9105				£217,750

Then 217,750 ÷ 9105 = 23·9; and the period allowed would accordingly be 24 years.

The paper also contains a statement showing the annual sum required to repay with interest a loan of £10,000 borrowed at 3 per cent. per annum for various periods not exceeding 60 years. The following are the figures: For a loan for 10 years, £1172; 20 years, £672; 30 years, £510; 40 years, £433; 50 years, £389; 60 years, £361.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 39.)

"It is a long lane that has no turning," and to the valley of despondency in the Stock Exchange a turn has come at last. It is pleasant to be able to record that a marked improvement was apparent in the general tone last week, and that prices in almost every line had a greater or lesser advance. Consols led the way with a bright recovery on extensive buying, and the gilt-edged division plucked up generally in view of it. The prospect of an early fall in money, coupled with advantageously low prices, was good enough to tempt buyers inside. Things might have gone even better, but for the impending Easter break to business. The Money Market was very hard in the first part of the week. It became easier with the turn of the quarter; and discount rates were not appreciably tighter. Business in the Gas Market was, on the whole, a good deal quieter, and what was done was to a very great extent confined within the limits of Gaslight and Coke issues. In fact, without them the record would have been meagre indeed. Still there were a moderate number of changes of quotation. In regard to the tendency, there was nothing very marked, and changes were about as many in one direction as the other. In Gaslight and Coke ordinary, after a quiet opening, there was a fair amount of dealing daily, and prices were tolerably steady, but without any disposition to advance. The best figures marked were 81½ on the opening day, but stock changed hands several times as low as 80, which was the closing mark. The secured issues were depressed in sympathy, and then prices shrank persistently; the preference, indeed, coming very nearly within touch of par. South Metropolitan was much more inactive, and showed signs of weakness, opening with a mark of 119½, and closing with 117½. Nothing at all was done in Commercials. Transactions in the Suburban and Provincial group were extremely limited, and movements were variable. Brentford old was put down; but Tottenham "A" and Southampton had an advance. Sheffield was done locally above the quoted price; but the quotation was left standing nevertheless. In the Continental Companies, Union was untouched; European was steady; and Imperial (which had been showing great firmness) developed a little weakness, and closed with a mark of 204. Among the remoter undertakings, Buenos Ayres debentures gained a point. There was further flatness in the Water Companies, and all Chelsea issues were put 5 lower. The general feature was a slight set-back of debenture stocks all round.

The daily operations were: Very quiet dealing in Gas on Monday. Gaslight preference fell 1. Tuesday was even quieter, and nothing moved. Wednesday developed some degree of activity. Gaslight preference moved down 1 more, and Brentford old 2. In Water, Chelsea receded 5, ditto debenture 1, and Lambeth and East London 3 per cent. debenture 1 each. On Thursday, there was more dealing in Gaslights, but nothing changed. In Water, New River debenture and West Middlesex debenture fell 2 each, Friday was rather quieter. Tottenham "A" rose 2, and Buenos Ayres debenture 1; but Gaslight maximum dropped 1. Saturday was moderately busy. Southampton rose 2½.

* The period was subsequently increased to 30 years, as regards the outstanding balance of the loan, in the event of an adequate supply of suitable water being obtained.

THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

BY

WALTER RALPH HERRING, M.INST.C.E., *Engineer.* *

ARTICLE XIII.—Accompanied by Plate No. 14, showing Transverse Sectional Elevation of the Charging Stage, Illustrating the Transverse Conveyor, Feeding Spouts, Longitudinal Push-Plate Conveyors over the Coal Bunkers, Measuring Chambers, Charging Shoots, General Arrangement of Charging Stage, and End and Chimney Bracing, and the Method of Manipulating the Slide-Valves of the Measuring Chambers by Means of Diminutive Hydraulic Cylinders.

THE STRUCTURAL STEELWORK OF THE RETORT-BENCH.

The structural steelwork of an inclined retort-bench is of far more elaborate construction than was formerly employed in connection with horizontal retort-settings. The light flimsy buckstays and bracing which at one time were used in connection with such work have ceased to exist even with regard to horizontal work—much more so with inclined retort work, where the structure of the bench is of necessity considerably greater than in the case of a horizontal retort installation.

Another point of considerable importance with regard to this matter is the fact that the structural steelwork of an inclined retort-bench is put up in such a manner as to avoid the necessity of the disturbance of any of the ironwork should the bench itself at any time require pulling down and reconstructing. Apart from the removal of the retort mouthpieces and the ascension pipes, the whole of the brickwork can be pulled down and re-erected without the disturbance of any other portion of the work—an important advantage, and one that is of some consideration from an economical point of view for the future if not in the present.

Plates Nos. 13, 14, and 15 illustrate the various parts of the

PHOTOGRAPH No. 62.—Front buckstays and drawing stage details.

structural steelwork of the Granton installation in addition to other important parts which will be subsequently referred to. They have been purposely drawn to a fairly large scale so as to embody the completest detail, and to present not only general arrangements, but also take the place of innumerable sheets of details which would otherwise have had to be published.

Plate No. 13 illustrates the structural work and the drawing-stage of the bench, and also the end buckstays. The front buckstays consist of 15 inch by 6 inch by 59 lbs. H steel joists. The lower ends are sawn square, and embedded in the concrete foundation—resting upon a cast-iron plate at the bottom of the pocket previously mentioned as having been provided when forming the foundations. The back of the buckstays was afterwards wedged tightly between the outer flange and the steel strap embedded in the concrete. This member is 30 ft. 10½ in. long over all. It is provided at its upper end (see Photograph No. 62) with angle cleats for supporting an 8 inch by 6 inch by 35 lbs. H steel joist, one end of which is secured to the 10 inch by 6 inch cross-tie; the outer end projecting over the mouthpieces for supporting the return track of the hot-coke conveyor. It is also convenient for the erection of the temporary staging when handling the ascension and bridge pipes, or in the event of their choking badly. The hydraulic main and the foul main, as well as the supports for the bridge pipes and ascension pipes, also rest upon this member. The hydraulic mains are supported upon cast-iron cradles bolted to the upper flange of the 8 inch by 6 inch joist. The foul main is likewise resting upon a cast-iron cradle similarly secured. The cross-tie for the front and back buckstays (Photograph No. 63) consists of a 10 inch by 6 inch by 48 lbs. H steel, securely cleated to the inner flange of the front buckstay, as well as being held in position by the splayed end of the 8 inch by 6 inch horizontal joist supporting the hydraulic mains, &c.

The back buckstay (Plate No. 14) consists of a 16 inch by 6 inch by 62 lbs. H steel joist, secured at its base in a similar manner to the front buckstay. This member (see Photographs Nos. 64 and 65) is 41 ft. 0¾ in. long over all. The cross-tie between the front and back buckstays is placed at an angle of 32°, and secured by means of angle-cleats and bolts to the inner flanges of both buckstays. The bolts, however, that can be accommodated in such a position are insufficient in themselves to preserve the full strength of such a member. The lower end is, therefore, secured in two places; and to bring an equivalent strength at the upper end, a 6 inch by ¾ inch flat steel strap encircles the buckstay—passing round a cast-iron bracket bolted to the back of the angular stay, so formed as to present a flat surface to the strap and counteract any stress upon the bolts securing it. (See Plates 13 and 14).

The upper end of the inner buckstay on the charging side is provided with angle-cleats to form a base upon which the 16 inch by 6 inch by 62 lbs. H steel horizontal transverse stay rests; the latter also supporting the coal-hoppers with the conveyors above and the measuring chambers suspended beneath—see Photograph No. 66. The end bracing for the bench (figs. 1 and 2 of Plate 13, and fig. 1 of Plate 14) consists of four buckstays, each

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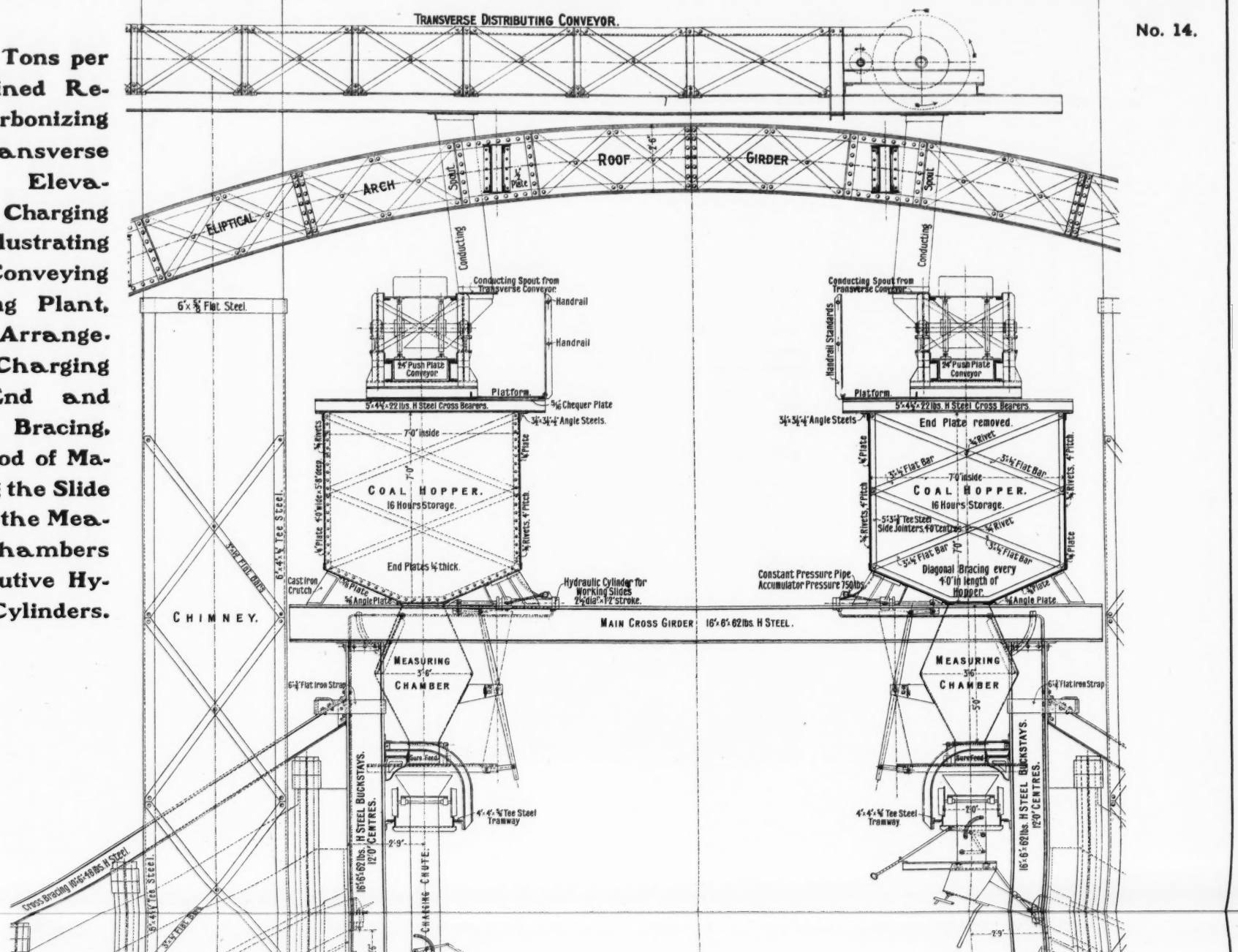
The Granton Works of the Edinburgh and Leith Gas Commissioners.

No. 14.

The 1000 Tons per Day Inclined Retort Carbonizing Plant—Transverse Sectional Elevation of the Charging Stage, illustrating Coal Conveying & Feeding Plant, General Arrangement of Charging Stage, End and Chimney Bracing, and Method of Manipulating the Slide Valves of the Measuring Chambers by Diminutive Hydraulic Cylinders.



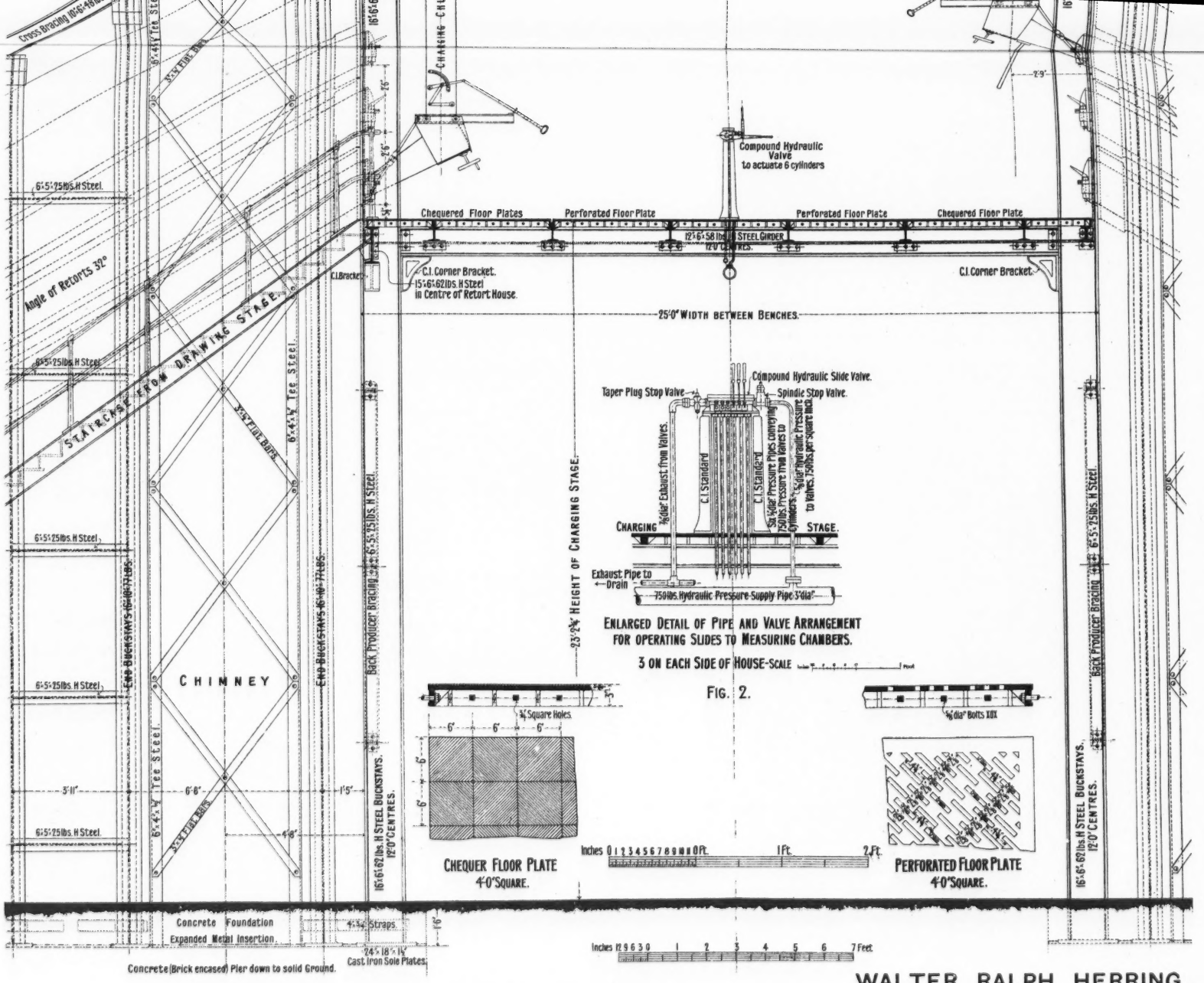

Cross Bracing 10"x6"x48 lbs.
6"x4½" Tee Steel.
6"x4½" Tee Bars.
6"x5"x25lbs. H Steel.
Angle of Retorts 32°
STAIRCASE FROM DRAWING STAGE.
C.I. Bracket.
End Buckstays 16"x6"x77 lbs.
CHIMNEY
3'11"
6'8"
1'5"
4'8"
Back Producer Bracing 24"x6"x5"x75lbs. H Steel.
16"x6"x62lbs. H Steel Buckstays 12'0" Centres.
CHARGING CHUTE
Compound Hydraulic Valve to actuate 6 cylinders
Chequered Floor Plates
Perforated Floor Plate
12"x6"x58 lbs. H Steel Girder 12'0" Centres.
C.I. Corner Bracket. 15"x6"x62lbs. H Steel in Centre of Retort House.
25'0" Width between Benches.
23'2¾" Height of Charging Stage.
Compound Hydraulic Slide Valve.
Taper Plug Stop Valve.
Spindle Stop Valve.
¾dia" Exhaust from Valves.
C.I. Standard
¾dia" Hydraulic Pressure Pipes conveying 750lbs. Pressure from Valves to Cylinders.
¾dia" Hydraulic Pressure to Valves, 750lbs. per square inch.
CHARGING STAGE.
Exhaust Pipe to Drain
750lbs. Hydraulic Pressure Supply Pipe 3"dia"
Enlarged Detail of Pipe and Valve Arrangement for operating Slides to Measuring Chambers.
3 on each Side of House-Scale 1 Foot
¾ Square Holes.
6" 6" 6"
6" 6" 6"
Chequer Floor Plate 4'0" Square.
Inches 0 1 2 3 4 5 6 7 8 9 10 11 0Ft. 1Ft. 2Ft.
¾dia" Bolts XIX
Perforated Floor Plate 4'0" Square.
Concrete Foundation
Expanded Metal Insertion.
4"x¾" Straps.
24"x18"x1¼" Cast Iron Sole Plates.
Concrete (Brick encased) Pier down to solid Ground.
Inches 12 9 6 3 0 1 2 3 4 5 6 7 Feet.

Fig. 2.

WALTER RALPH HERRING,
M.INST.C.E., *ENGINEER.*

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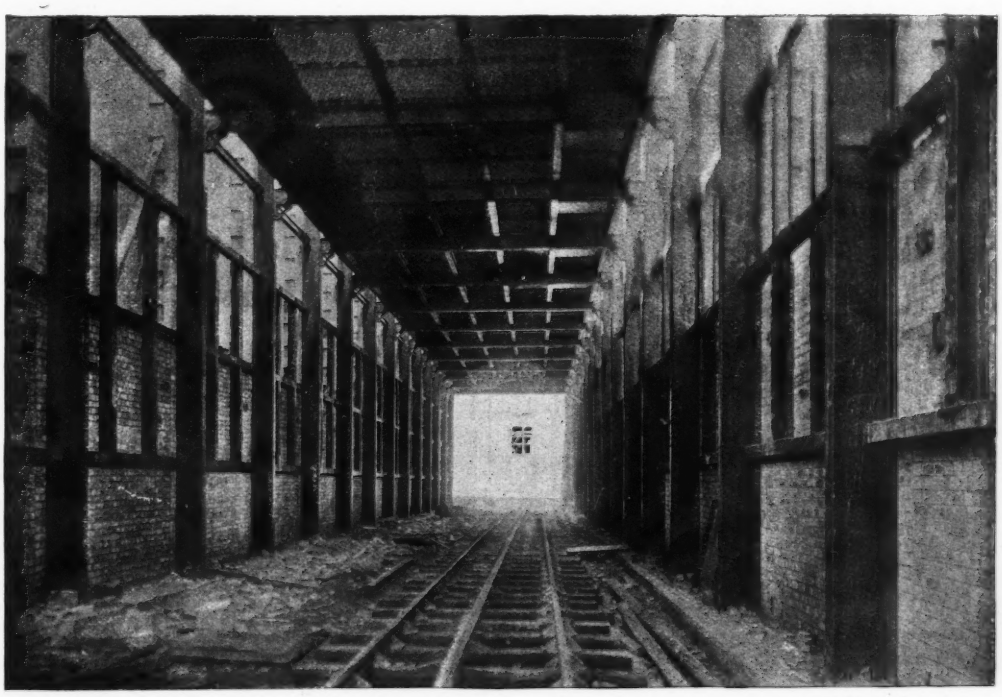
PHOTOGRAPH No. 63.—Structural ironwork, cross-bracing between the buckstays, supports for the hydraulic main, foul main, and coal bunkers.

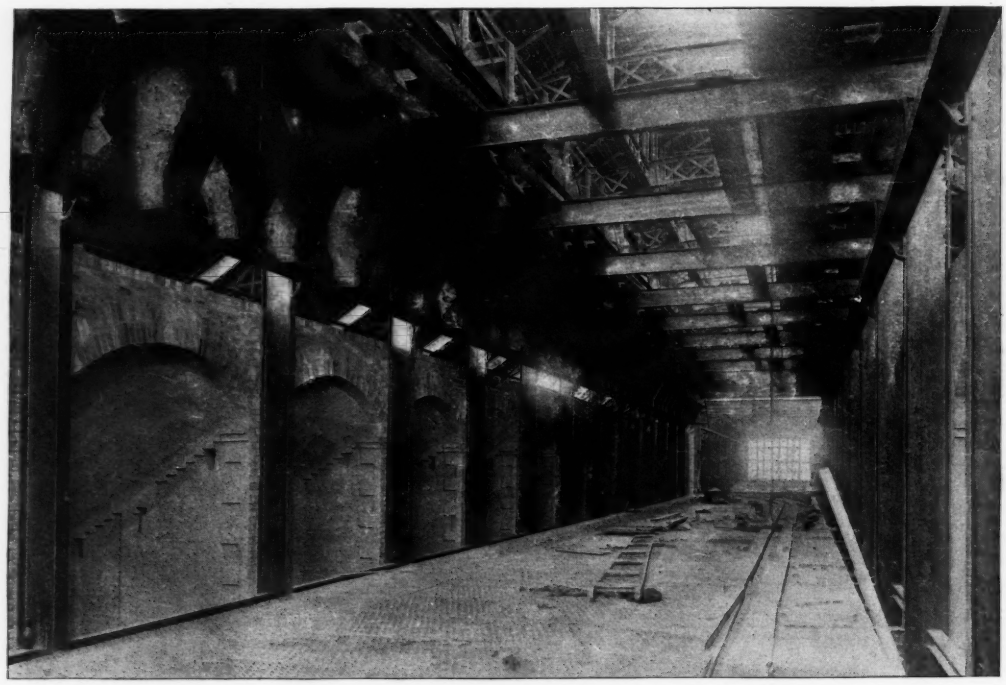
composed of a 15 inch by 5 inch steel joist with a 10 inch by ½ inch steel plate riveted on the back and front by means of ¾ inch rivets, 9 inches vertical pitch and 2¾ inches horizontal pitch; the rivets being countersunk on the side next to the brickwork. Each buckstay weighs 77 lbs. per lineal foot. The end buckstays are secured at their feet in a manner similar to the front and back buckstays. The upper ends project above the brickwork of the bench and are encircled with double straps composed of 6 inch by ¾ inch flat steels, which are bent and provided with eyes for attachment to the 2⅛-inch diameter longitudinal tie-rods. Each buckstay is provided with a double line of 2⅛-inch diameter longitudinal tie-rods, fitted with the usual coupling-boxes, with right and left hand screws, affording the full sectional area of the bar at the bottom of the thread.

The insertion of the double tie-rod arose from an experience I had some years ago with similar work. Upon heating up one bench, no less than two out of the three tie-rods broke, owing to defective welding. Realizing that such a contingency might always occur, I determined thereafter to trust only to two rods on each buckstay; each rod being rather less in area than if single ones were employed. The end buckstays are braced together horizontally, by means of 6 inch by 5 inch by 25 lbs. H steel joists in tiers spaced 5 feet apart from the ground upwards (see Photograph No. 67); the bracing being fitted so as to bed tightly upon the brickwork of the bench. The front and back buckstays, in addition to acting as such, are also made to support the drawing and charging stages. In fact, the joists forming the stage floors are also made to act as struts for the buckstays both on the drawing and also on the charging stages. The whole of the plates previously referred to illustrate this detail—Photographs Nos. 62 and 64.

Both the drawing and charging stages consist of cast-iron floor



PHOTOGRAPH No. 64.—General arrangements below the charging stage—illustrating the back buckstays, the back of the producer framing, and the underside of the charging-stage floor.

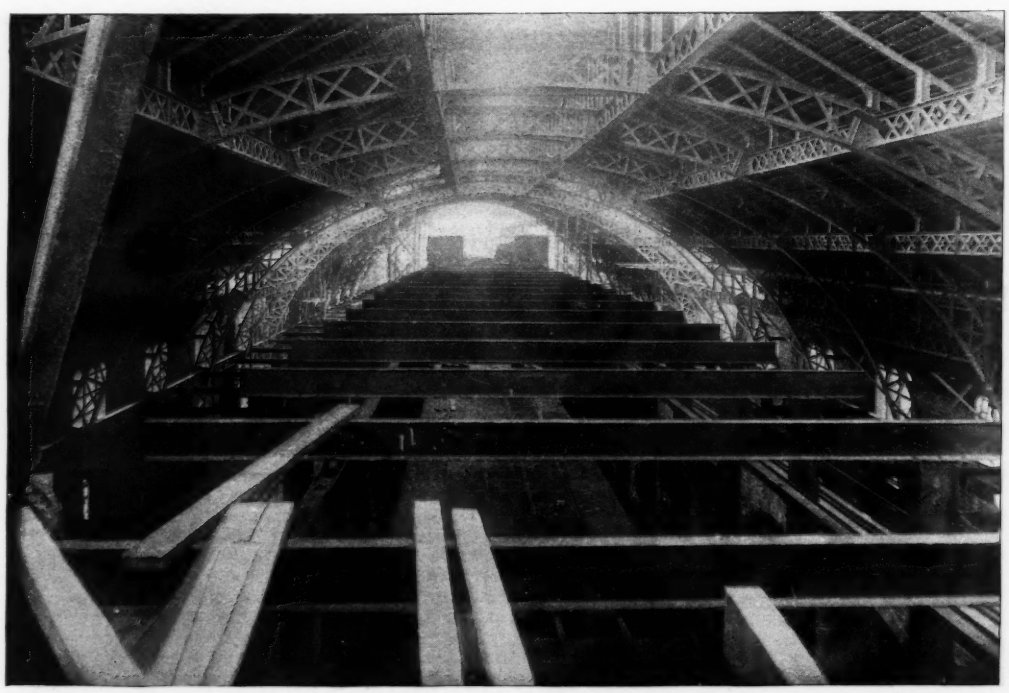


PHOTOGRAPH No. 65.—Upper side of the charging stage, with the superstructure supporting the coal bunkers and the measuring chambers.

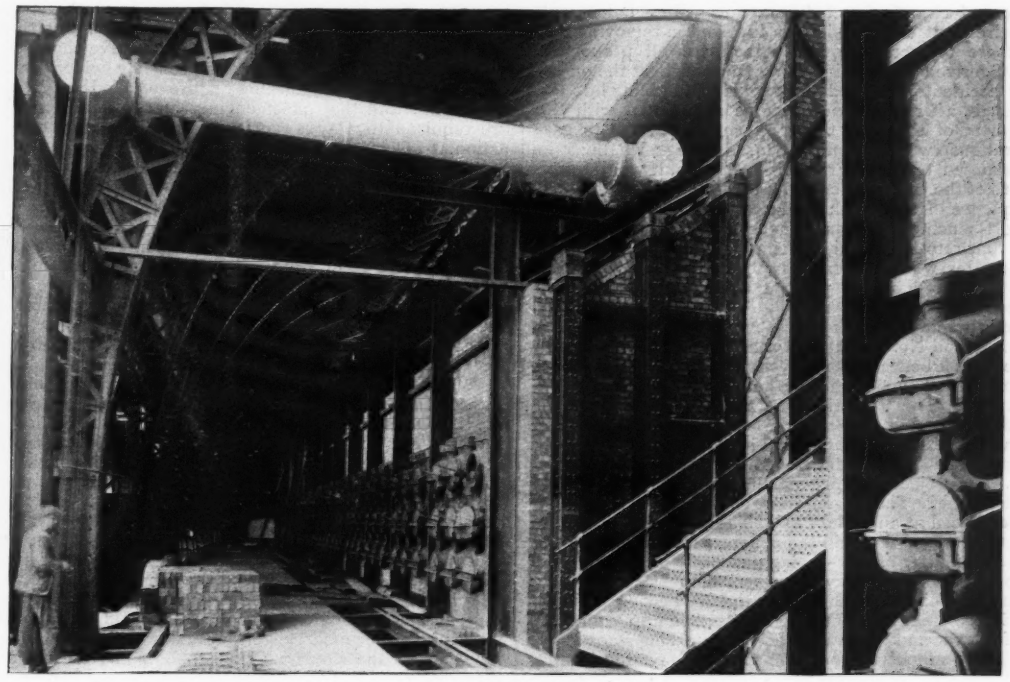
plates or gratings resting upon steel joists, supported upon the buckstays, or partly resting upon the walls of the building. The charging stage (Photograph No. 65) is 25 feet wide between the brickwork of the benches. Attached to each buckstay is a cast-iron bracket, upon which a 12 inch by 6 inch by 58 lbs. steel joist rests, and is also secured by means of angle-ears to the outer flanges of the inner buckstays. These main transverse joists are 12 feet centre to centre; one opposite each buckstay acting as a strut from side to side. Each bay of 12 feet span is divided by means of 6 inch by 5 inch by 26 lbs. H steels, spaced 4 feet centre to centre transversely across the stage, resting upon angle brackets riveted to the web of the main girders. The floor plates or gratings are provided with flanges on the lower side, and rest upon these floor joists; the plates being bolted together to secure them in position. For a breadth of 12 feet down the centre of the charging stage, the floor is laid with cast-iron open gratings for the full length of the building; the remainder of the staging on either side of this 12 feet being covered with solid plates of the pattern illustrated.

The introduction of perforated gratings on this stage with a back-to-back bench, or in fact on any bench, is of considerable advantage to the men; the air current passing through the perforations from below saving the men from a good deal of discomfort and exposure to the heat—enveloping them, as it were, in a non-conducting current of reasonably fresh air. The floor plates on either side of these gratings must be kept clear of the brickwork of the bench, so as to permit of its free expansion without disturbing the level of the floor. After the settings are in full work, this space can be temporarily filled in with brickwork and a little fire-clay.

The drawing stage (Photograph No. 62) is laid entirely with solid cast-iron plates resting upon joists in a similar manner to



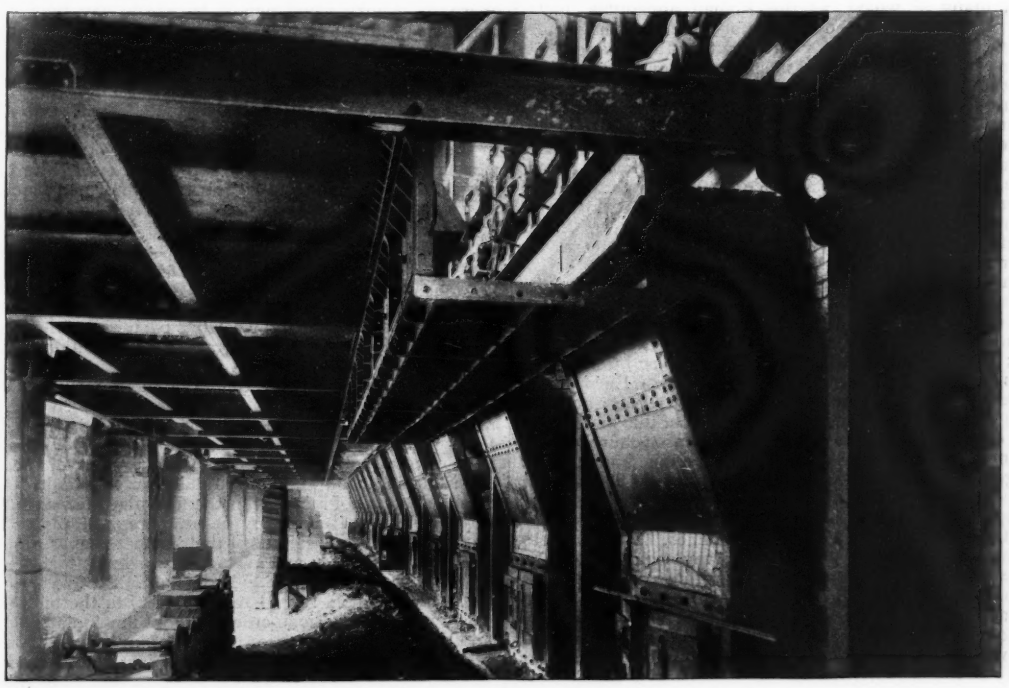
PHOTOGRAPH No. 66.—Transverse supports resting upon the inner lines of the buckstays for supporting the coal bunkers.



PHOTOGRAPH No. 67.—General illustration along the drawing stage, showing the chimney forming part of the end buttress wall—an additional buckstay being upon the opposite side of the chimney (not seen).

the charging-stage. Every alternate main transverse joist, opposite each buckstay, rests upon the shoe or base casting of the curved girder of the roof, and is bolted thereto (see Plate 13); the construction of the building at this point being purposely made sufficiently strong to resist the thrust from the bench without disturbing the structure of the building. There can perhaps be two opinions with regard to the wisdom of this practice—some preferring to leave the stages entirely clear of the building as a structure. My experience, however, has not hitherto shown that advantage cannot be taken of the portion of the main pier supporting the curved girder of the roof for resisting some of the outward thrust from the bench.

The intermediate joist between the 24 feet bays of the main girders is supported upon a specially formed bow-string girder (Plate No. 13, fig. 2), the ends of which are also attached to, and rest upon, the cast-iron shoe of the curved girder of the roof (Photograph No. 62). This was necessary to prevent the outward thrust from the bench pushing out the shell of the brickwork which really forms the side walls of the building intermediate between the main piers. The general arrangement of this is illustrated upon Plate No. 9, and in detail upon Plate No. 13. The intermediate joists on the drawing stage are similar in section and methods of attachment to those already referred to upon the charging stage. Beneath the drawing stage, and forming part thereof, the hot-coke conveyor trough is suspended (Photograph No. 68); the trough consisting of cast-iron plates with renewable bottoms, bolted to channel steels laid in between the main stage joisting at a sufficient distance to prevent the expansion of the producer structure pressing outwards against the cast-iron trough at the stage level—bulb rails being fixed for the discharging shoots to travel upon. At the outset, the conveyor trough was intended to be covered continuously throughout the length of the retort-house, partly by means of permanent cast-iron covers and partly by lighter portable steel covers. In practice, however,



PHOTOGRAPH No. 68.—Illustrating the underside of the drawing-stage floor, with the hot-coke conveyor trough partly in position.

the operations of charging and discharging with "four-hour" work are so frequent that the labour involved in removing and reinstating these temporary covers was out of all proportion to the benefit derived from doing it, and although at the outset many minor accidents occurred through men tumbling into the conveyor trough, after they once became acquainted with the operations (most of the men being altogether strange to gas-making operations), we now find no disadvantage whatever in having the exposed trough. From Plate No. 13, it will be seen that the depth of the trough is considerable. This was provided for in consequence of the length of the conveyor serving a frontage to a retort-bench of 500 tons per day, with the possibility of no less than four retorts discharging simultaneously into it. But as this is a matter which appertains more particularly to a description of the coke-handling plant, it need not be dealt with further at the present stage.

The chimney bracing is illustrated upon Plates 14 and 15. The bracing (Photograph No. 67) extends a height of 52 ft. 6 in. from the floor line to just beneath the curved roof-girder. It consists of T steels erected at each corner of the chimney, which itself is 9-inch brickwork. The T section was adopted to permit of the making of the bracing first as two simple latticed girders erected on either side, and thereafter the introduction of the diagonal bracing tying the flanges of the two girders together across the breadth of the chimney. The projecting flange of the T steel allows the rivets to be afterwards secured. The diagonal bars consist of 3 inch by ⅜ inch flats, and are spaced at an angle of 53°. The drawing shows these angle steels to be secured within the concrete foundation. They were not so as a matter of fact—being purposely left clear on the floor line, so as to permit of any movement of the bench end-wise freely moving the chimney with it upon the dry bed on which it was laid. Each chimney has within it a butterfly damper actuated by means of a lever and quadrant from the charging stage level; the damper being supported upon a steel spindle resting in cast-iron plummer-blocks sunk into the walls of the chimney—the damper itself being also of cast iron.

Beyond the bracing of the projecting part of the producer (Plate No. 13), no additional stays are employed for strengthening this part of the setting. The back part, however, beneath the charging stage (Plate No. 15 and Photograph No. 64) is stayed by means of 6 inch by 5 inch by 25 lbs. H steel frames secured by angle cleats and ears to the back buckstays as shown.

A PROPOSED NEW SYSTEM OF BUILDING RETORT-HOUSES.

First Article.

The question of the durability of engineering structures has often been discussed by engineers, with particular reference to the important part and the extensive degree now taken by, and assigned to, iron and steel in modern constructions. This material is in itself perishable; and in this respect it compares unfavourably with the masonry buildings of the past days of engineering, many of which, as the Roman aqueducts, have endured to this day where they were not wilfully damaged or culpably neglected. Yet, as was pointed out in the course of a recent discussion on this subject, it is easy to misunderstand and to exaggerate the enduring quality of masonry. Due allowance should be made for the effects of weather; and it should be borne in mind that those who point to the secular permanence of the builders' work of Egypt, Greece, and Rome, usually overlook the circumstance that a favourable climate has had as much to do as the builders' art with endurance of their structures. A rainless climate and absence of frost are grand preservatives of bricks and mortar. Even mud walls, if covered from the direct action of rain, will stand for any length of time in regions where frost is unknown or is but a passing visitant.

When masonry is exposed to the severities of a harsher climate, and especially to alternations of wet and dry, hot and cold, it loses much of its enduring quality. Economically viewed, it will become, under these climatic conditions alone, anything but imperishable; and even the best examples of stone or brick building, such as the cathedrals and castles of Northern Europe, are found to require incessant and costly external repairs and upkeep. The general lack of adequate provision of this kind is the originating cause of most of the costly restorations of churches and other ancient buildings with which the present and the immediately preceding generation have been so heavily burdened. The subject is mentioned here only for the sake of the proof it furnishes that the presumption of durability is not to be granted, without qualification, to the best masonry of northern climes. Moreover, all such buildings as have entered into this survey so far possess the inestimable advantage of quiescence. There is no shaking either of subsoil or superstructure in the case (say) of Windsor Castle or York Minster. The moment, however, that earth-tremors come into question, or moving machinery has to be housed, a total change is wrought in the conditions of endurance of masonry structures. It is practically impossible to assign a limit to the action of this destructive agency, so as to say that any shaking of a building, however slight, is harmless as regards its continuing security. The aspect of the oldest walls in works where heavy weights are continually being moved, or where much machinery is employed, sufficiently attests the destructive character of constant shaking, though it may not be sensibly evident at any time. Seeing that the distinguishing feature of modern civilization is movement, and that most engineering structures in particular are required to play a part in relation to large forces in rapid action, it follows that no materials of construction or method of building which cannot be reconciled with this necessity can be tolerated at all, much less have a chance of showing their powers of endurance under the actual conditions.

For the foregoing reason, among others, from the first appearance of iron as a material of construction—which dates from the success of the rolling mill—it and its congener, steel, began to take the places of woodwork and masonry in the pardonably mercenary affections of engineers. Metallic constructions offered the attractions of unlimited length and breadth of scantlings and of easy jointing. Moreover, the material lent itself to the passion for calculating constructional means to ends, which became a distinguishing "note" of modern engineering. The engineer with a mathematical attachment to his designing mind—which the late Oliver Wendell Holmes described as like a lever escapement put into a watch—liked to satisfy himself as to what strength he wanted for his purpose, and how he might get it. Ironwork construction favoured this new way of treating the problems of building; and accordingly—with the prudent provision of a large "factor of safety" (which some have disrespectfully called a "factor of ignorance")—the engineer proceeded to erect iron roofs and bridges in the firm belief that he was doing great things. For the lifetime of a generation, masonry construction seemed to be relegated to the background of the engineering world, while iron, and later steel, came to the front. Its day appeared to lie in the past. The modern working and travelling community could not wait for the slow laying of stone upon stone, or brick upon brick, by which viaducts grew in olden times. The railway had to be thrown across the roadway in a night; and it was done.

But there were countervailing considerations left to assert themselves in the course of time; and meanwhile another great gain of modern industry—portland cement—came upon the busy scene. After cement, concrete; after concrete, its reinforcement with steel. So that when, in due course, the time came for a reconsideration of the merits of ironwork construction, in the light of experience, the alternative was no longer the ancient masonry, with its weakness under the disintegrating influences of frost and shaking, but something which offered a combination of the handiness of metal with the solidity of stone. And it was high time. Engineers had grown a little ashamed of the "factor of safety," which meant a voluntary restriction to a 25 per cent. calculated efficiency, and, after that, left a good deal to individual judgment guided by experience. If the structure was also a machine, its scantlings could not be satisfactorily arrived at upon this basis; and if it had to be exposed to deteriorating influences, an indefinite margin of substance must be provided to resist them. Here was the opening for departure from the fashion of building in iron and steel. To a considerable extent, engineering returned upon its tracks, and employed ancient masonry once more. An example in point is furnished by the reconstructed viaducts on the Cornwall line of the Great Western Railway, originally made of wood. Thirty years ago, it is safe to say, they would have been replaced with iron bridges. Now they are being rebuilt in solid stone.

The wheel of changed engineering opinion only came round full circle, however, when the success of reinforced, or armoured, concrete was assured beyond the possibility of cavil. Here was metal which could not perish, and might therefore be trusted up to the limit of its size and strength, combined with monolithic masonry which would neither crumble nor shake to pieces. Of course, it takes time for so novel a system of construction to win its way; but there is no hurry. Conviction has to be built up by degrees; and it will be useful to glance at the stages over which it must be arrived at. To return to the matter of the perishability of iron and steel structures. This, as we have already observed, is a consideration that has of late years assumed greater importance than ever, as is only natural when it is remembered that a great quantity of iron and steel has been in position long enough to be pulled out without disgrace. Its condition has in consequence been disclosed, with results at once satisfactory and monitory. Speaking quite generally, this is what has transpired: Where steel members of structures have been buried in dry masonry, especially in cement concrete, the metal is found perfectly preserved. On the other hand, where iron and steel have been exposed to the weather, to contact with wet ashes, to gases from burning coal, and to steam, it has so perished that only a wasteful excess of material in the first place has saved the structures from ruin. In many cases, bars and plates have been found reduced to skeletons of their former shapes, and the framework of which they are parts has yet hung together—showing how little work they really had to do. Some years ago, much anxiety was felt in regard to the safety of the metal bridges so freely used in American cities, without much margin of strength; and a general investigation and cleaning up of these structures resulted. The sand-blast machines just then introduced came in very useful for this purpose; and in the course of the undertaking then set on foot, sundry noteworthy discoveries were made. One of the best accounts of the results arrived at in this way was

given in a paper contributed by Mr. G. W. Lilly to the American Society of Civil Engineers, and what he said will serve admirably for a comment upon old iron buildings in general, and so form a fitting conclusion to this part of the present essay.

An enormous bulk of professional writing has been devoted to the subject of the preservative painting of ironwork; and, apart from all questions relating to the quality of the pigments and the media employed for this purpose (which cannot be gone into here), it has come to be pretty generally understood that initial cleanliness of the surfaces to be painted is more than half the battle. It has often been noticed that mill marks made with paint of no particular goodness have remained upon steel and perfectly protected it from rusting, while other portions, covered carefully with selected paint, have rusted badly under the coating. The explanation is found in the fact that the marks were made upon the clean metal, whereas the later painting was put upon the mill scale, rust, and grease which had accumulated even before the shop work was finished, to say nothing about what happened after. Buyers of ironwork are apt to lose sight of the fact that the material has to be laid in some time before it can be worked up, and that the perishing process has often started in it before the members of structures leave the makers' yard. After delivery, ironwork usually has plenty of chances to begin to deteriorate by the time it is handed over to the cleaners and painters. Seeing the elevated situation and complex forms of much structural ironwork, it is practically impossible to depend on the thoroughness of the hand scraping and painting which is all that it mostly receives. Sand-blast cleaning is undoubtedly thorough—getting, with proper use, a clean, bright metallic surface on the work to which it is applied. Paint on such a surface is the only known means of preserving the material; and this remedy against the rusting of iron and steel can only be relied upon as being thoroughly effective in the case of new work when it is applied on the makers' premises, before the pieces are sent away. Of course, this treatment is too costly and troublesome for the manufacturers to adopt on their own initiative. The subsequent preservation of the structures they build is no concern of theirs—quite the contrary, some might observe.

Sand-blast cleaning can be applied to old work in position; but then it is necessarily more expensive. A reasonable estimate of the cost of this kind of cleaning for plates and angles not too inconveniently situated puts it at from 1d. to 1½d. per square foot. An air pressure of from 25 to 45 lbs. is required, according to the amount of scale, dirt, and old paint to be removed. According to Mr. Lilly, on the old railway viaducts of Columbus, Ohio, the bright surface of the steel, looking almost like frosted silver, was always attained for the painters, who immediately followed on, and never left a cleaned surface over-night. Such cleaning as this need not be repeated every time the work is repainted; but it has the great recommendation of setting the mind of the responsible engineer at rest as regards the condition of metallic structures in his charge.

ELECTRIC LIGHTING MEMORANDA.

A Hitch in the Marylebone Transfer Proceedings—No Power to Act—The Painful Experience of Hastings.

An extraordinary complication has appeared in the Marylebone affair. Resuming our narrative of this important business from the point where it was last left off, which was at the stage of formal application by the Borough Council to the London County Council for the capital loan required to carry out the Arbitrators' award, it now appears that the Borough Council are without the necessary statutory powers to engage in the undertaking. The first inkling obtained by the general public of the existence of this remarkable hitch in the proceedings was in connection with the annual financial statement of the London County Council, which it was explained did not cover anything on account of the Marylebone application, for the reason that Counsel had advised that the Borough Council had no power to borrow the money as proposed. It seems rather late in the day for such a discovery to be made, and the announcement burst like a bomb-shell under the carefully-laid scheme of the Borough Lighting Committee. It has transpired that the Committee were all ready with a report for last Thursday's meeting of the Borough Council, stating what arrangements had been made for taking over the severed portion of the undertaking of the Company as from the 1st of January next, including the engagement of the Electrical Engineer.

On the previous Tuesday, however, Lord Welby had given public expression, at the meeting of the London County Council, to the legal advice the Finance Committee of this body had received, to the effect already stated—that the County Council could neither lend the money to Marylebone, nor give its sanction to the borrowing of the sum required, owing to the fact that the Borough Council are not the lighting authority, and have no right to carry on an electric lighting scheme. A more remarkable *fiasco* of the kind was never known. Mr. Debenham, the Chairman of the Borough Lighting Committee, who is officially responsible for carrying on the affair of the transfer, had to bring the new phase of the transaction before his Council instead of proceeding on his report. All he could say was, that if the legal position is as stated, there had been an extraordinary oversight on the part of the advisers of the Borough Council who had drafted the Act under which the arbitration was held. In the circumstances, he proposed that Counsel's opinion should be taken as to the rights of the attitude of the London County Council in the matter, with power to appeal to the Local Government Board or to Parliament in the event of the opinion confirming that of the advisers of the County Council. It is a forlorn hope that the Borough Council will get the lacking statutory powers this session, as a matter of urgency; otherwise it seems that the whole scheme of transfer must fall through. It is a singular situation, and one would say without precedent. The awkwardness of the case is not mitigated by the fact that many interested people, whether professing municipalizers "on principle," or mere ratepayers of Marylebone, are secretly rejoicing at the timely appearance of a practicable means of escape from an extravagant and ridiculous bargain. The report of Mr. Asquith's opinion should be interesting reading.

Partisans of municipal trading in electricity, while afraid of their asserted principle in the leading case of Marylebone, are careful to pass over in silence such painful examples of disastrous practice in the same line of enterprise as that of Kingston-on-Thames, mentioned in this column last week. They take refuge in generalities, which may serve to pad out a review article or a newspaper leader, but contain no comfort for those who pay for trading local authorities' losses. This week we have another sad case to comment upon—Hastings, which is a crying example of municipal extravagance and folly displayed in the pursuit of a fixed idea. Kingston had the distinction of starting its municipal electric lighting by itself, and now wishes it had not been so venturesome. Hastings bought its undertaking ready made, from speculators who had the best of reasons for applauding this display of municipal Progressivism. The results have not hitherto justified the proceeding; and it is hardly to be expected that they ever will. It is a common boast of apologists for municipal electric lighting that it is usually charged at a lower rate than companies demand; and no wonder, when any deficiency in the revenue account is charged upon the rates. But there is a worse side to municipal electricity supply even than putting the loss upon the ratepayers; and this is, carrying it forward year by year as a suspense account, and paying compound interest upon it as an unauthorized loan. Hastings last year dropped behind £1080 more upon the electric lighting business, notwithstanding the heroic charge of about £40 a year for the public arc lamps, or somewhere after the rate of £1000 per mile of street lighted. And this upon a midnight partial-extinction schedule! A desperate endeavour was made not long since to attract more private custom by reducing the price of the unit, which stands at slightly under 5d. Local suspicion will have it that this is a piece of favouritism from which nobody benefits but a few well-to-do people who do not need financial assistance out of the rates. Yet in those statistical tables in which some electricians so greatly delight, Hastings would figure as an example of a municipality supplying electricity at a cheap price. How would the favoured patrons of the undertaking on these terms relish being classed with paupers, as obtaining relief at the expense of the body politic? Yet they are nothing else. Of course, if the Hastings Corporation do not themselves take the finances of the Electricity Department in hand, they will receive a peremptory notification from the Local Government Board, either to cease doing business under cost price, or to wipe off their trading deficit out of the next district rate. This sum now amounts to £4515 as the ascertained loss upon the last three years' trading. There is more that does not appear on the surface; since, as usual, the Corporation have not set aside anything for depreciation, and probably are no better off as regards reserves. The capital account has been swelled to close on £130,000, which is nearly double the original cost of the property; and the interest and sinking fund come very heavy upon the struggling business. One wonders what the Corporation would get for it if they were to part with it again.

High-Pressure Gas-Lighting at Hamburg.—Herr R. Steilberg reports, in a recent number of the "Journal für Gasbeleuchtung," that owing to the lighting of the Hamburg Central Slaughter-House having for some time been inadequate, it was decided to instal a system of high-pressure incandescent gas-lighting. Formerly when a large number of burners were in use at the same time, the pressure in the pipes was insufficient and irregular; and attempts to improve matters by putting in larger pipes did not prove effectual. There were 2000 flat-flame gas-burners, corresponding to a total lighting power of 21,000 candles, with a consumption of 7750 cubic feet of gas per hour. These burners have now been replaced by 600 "Millenium" high-pressure gas-lights. A six-months trial of the light in one of the halls had proved in every way satisfactory. The 600 burners give a light of about 88,000-candle power, with a consumption of gas of only 3200 cubic feet per hour. For imparting the high pressure to the gas, seven sets of apparatus—each of a capacity of 700 cubic feet per hour—have been erected. Each set is driven by its own electro-motor of ⅓-horse power. The "Millenium" apparatus itself consists of a double-action pump, a gas-receiver, and an automatic regulating arrangement which keeps the pressure of the gas supplied to the lamps constantly at 1350 mm. (53 inches) of water.

FROM EARLY VOLUMES OF THE "JOURNAL."

April 10, 1849.

THE parliamentary session of 1849 seems destined to exercise as important an influence over the future progress of gas lighting as did that of 1825. The latter gave stability and an impulse to the nascent art, and the former promises to correct many of the popular errors and prejudices into which the public have fallen, and to establish certain economical first principles, the neglect of which, in the origin, has been the cause of much dissatisfaction on the part of the private consumer of gas, and injury to the owners of gas property. We allude particularly to the opinions prevailing among parties of the class of the writer in the "Morning Advertiser," and speakers at public meetings of gas consumers, who maintain that gas costs less than nothing, by profit realized on the sale of the residuary products. Such persons must now see that it is an article costly in its manufacture and expensive in its distribution. Another fallacy may now be considered as exploded—viz., that of supplying the public lamps at less than cost price, the difference being compensated for by an extra charge on the private consumer. On this head none of the parties who have appeared in Parliament during this session, whether representing private consumers, lighting commissioners, or others, seeking to impose restrictions on old companies or to incorporate new ones, have ventured to suggest an excuse, nor have any hinted that less profit than 10 per cent. was sufficient remuneration for capital judiciously applied and invested in this branch of industry. Every witness hitherto examined before the Parliamentary Committee has confirmed these opinions; and the Committee sitting on the Gas Bills of the session has itself ratified them with the seal of its approbation.

Mr. Henry M. Payne, of Worcester, Mass., informs the "Scientific American" that he has discovered a means of generating light, by mechanical action, from water and lime. Mr. Payne says: "I have continued the experiment at intervals, and I am now enabled to announce a successful result. I have produced a light equal in intensity to that of 4000 gas-burners of the largest batswing pattern, with an apparatus occupying 4 square feet of room, at a cost of 1 mill. per hour; the current of electricity being evolved by the action of the machinery wound up with a common lock key, and the only materials consumed are water and lime. I am now engaged in making an apparatus for public exhibition, which will be completed this winter, and all its parts submitted to public inspection, except the interior of the generator."

At the last meeting of the Ashmolean Society, Dr. Daubeny exhibited an apparatus to show an easy method of producing a light, capable of superseding oil, or even gas, simply by passing a stream of atmospheric air through inflammable liquids of a volatile nature, such as ether or the liquor condensed in the preparation of oil gas.

We note considerable flatness in the metal market, and a reduction of prices in most branches of these trades. Manufacturers generally complain of great want of orders, much of which they attribute to the disinclination of gas companies to extend their works, while such uncertainty hangs over their future progress and welfare. For our part we are rather inclined to look to the early closing movement as operating prejudicially on the prospective demand for gas, and that another year must elapse before many of the works have recovered what they have lately lost in this respect.

GAS COMPANIES AND LIGHT RAILWAY INQUIRIES.

IN the early part of 1902 a Syndicate made application to the Light Railway Commissioners to grant powers for the construction of a light railway between the towns of Torquay and Paignton, with various branches in either town. Accordingly, an inquiry was ordered to be held last July. The Torquay Corporation, the Gas Company, and others, gave notice of opposition. Counsel and experts were engaged; but, on the day before the inquiry was to have been opened, notice was received that the promoters had dropped the case. The Corporation then considered the subject, and several proposed routes were suggested; but, owing to the strong opposition in the town, they were unable to promote a Bill. They were, however, empowered to, and actually did, enter into negotiations with several companies who were seeking powers to make tramways in Torquay. These negotiations did not come to anything; and last November a Syndicate with the title of Power and Traction, Limited, gave the usual notice that they intended making application to the Light Railway Commissioners for the necessary authority to construct lines between Torquay and Paignton, and along several roads within the borough boundary; and an inquiry was ordered to be held on Feb. 25 last. Again, all the opponents had to prepare their evidence, &c. The inquiry was held on the day appointed, and the promoters laid their case before the Commissioners. At its close, the Commissioners, without calling upon the opposition, decided not to grant the Order.

Now as to the effect of all this upon the Gas Company. The Torquay Gas-Works are situated on the main road, about half way between the towns. This road practically follows the coast-line between Torquay and the works, and, in consequence, there are some sharp curves. The height above Ordnance datum varies between 14 and 90 feet; and the width varies from 30 to 16 feet, with an average of about 19 or 20 feet for the part in which the Company were most interested. The trunk mains, two in number, run side by side—of course, on the land side of the road; and the promoters also proposed to keep their single line on this side—3 ft. 6 in. being the gauge. The necessary double lines for crossing places occupied a space of 14 feet; and as one of these was situated at the narrowest portion of the road—viz., where it was only 16 feet wide—it practically meant that the whole of the road would be covered by a bed of concrete at this point. Further, the scheme as shown would have meant that the Company's trunk mains for about the distance of a mile would have been covered, and therefore would have been inaccessible.

In the proposed Order the usual clauses were inserted which are supposed to give gas companies protection; and the Company had to show that, taking all the facts into consideration, they were not sufficient. This would not have been difficult. When asked by Counsel whether they (the promoters) intended to purchase land to widen the road, the various witnesses replied: "Certainly not, as the scheme would not pay if burdened with a large capital outlay." Now, without doing this, it would have been impossible for the Company to take advantage of the clauses giving them power to insist on having their mains shifted; for there was no room in the road for doing it. As to the danger of the pipes being damaged by electrolytic action, the Company would have entered a protest against the Board of Trade clauses, but without much hope of gaining any redress, as they could not bring forward any evidence of injury to mains. On the routes over which it was proposed to construct the light railway in the district supplied by the Company, beyond that mentioned, they would have asked for the insertion of a special clause to compel the promoters to relay the mains at a greater depth, so as not to interfere with the services; thus following on the lines of the Ilford decision.

So much for the actual case. Now as to the authority to whom the promoters applied for powers. The Company hold that it was not right that the Light Railway Commissioners should have granted an inquiry. The Act under which they work was brought into existence for the purpose of enabling lines, in purely agricultural districts, to be laid down, so as to form a better means of access to the main lines of railway, to which they should act as feeders, not that they should run in opposition to them, as they would have done in this case. There is also one other point of which some explanation is required. It is the want of power from which the Commissioners suffer in not being able to make an order for the payment of the opponents' expenses should the promoters fail in obtaining the powers sought for.

TECHNICAL RECORD.

TRANSMISSION OF POWER BY GAS.

Paper by Professor Burstall.

A large party of members of the Birmingham Section of the Institution of Electrical Engineers visited the Metropolitan Carriage Works, Birmingham, on the afternoon of the 25th ult., to inspect the 250 brake horse power Westinghouse gas-engines installed there for the purpose of driving two-phase alternators in parallel. Mr. Bell, the Westinghouse Company's gas-engine expert, was present, and furnished all the needful explanation. It was stated that the engines had proved both satisfactory and economical. There are now altogether three Westinghouse installations in the Birmingham district—the other two being at Messrs. Cadbury's and the Small Arms Factory—employing units of 250-horse power with producer gas. In the evening the members assembled at the University, under the presidency of Mr. Henry Lea, to hear a paper read by Mr. F. W. BURSTALL, M.A., M.Inst.C.E., on "Power Transmission by Gas."

In opening his subject, Professor Burstall referred to the proposal made by the late Sir William Siemens some years ago, to transmit power over comparatively long distances by means of gas under pressure. No attempt was made to bring his scheme to a successful issue; but the development of the system of distributing power over large areas by high-tension currents had caused attention to be again directed to the subject. Granting that some suitable cheap gas could be manufactured from common coal, there were certain advantages in gas transmission which were entirely lacking in the transmission of energy in any other form. The loss of power which took place in a gas-main might be roughly stated to vary as the square of the velocity of the fluid within it; and since the density of gas was small as

compared with water, the actual co-efficient of friction was very low. To pass a given amount of power, in the shape of gas, through a main, either the velocity must be increased or the gas must be transmitted under pressures very much in excess of those used in a main conveying lighting gas.

Having described briefly the methods of producing coal gas, water gas, and Dowson and Mond producer gas, Professor Burstall went on to say that in order to obtain all the advantages of the transmission of power by gas, the producer station should be placed as near as possible to the field whence the coal was obtained, so as to reduce the cost of transmission of the raw material. The size of the plant should, of course, be large—not less than 5000, but preferably from 20,000 to 50,000 horse power. In most cases there would not exist in the immediate neighbourhood any large demand either for power or gas for heating. It was necessary, therefore, either to transform the gas into electrical energy on the spot, or else transmit the gas itself in pipes. A great advantage attending the transmission of gas was due to the fact that it might be reasonably expected to obtain a very much better load-factor than was the case with electricity, because not only was the demand for heating larger than that for power and lighting, but, in general, it was a much more even load. It was fair to assume that of the total gas produced 60 per cent. would be used for heating purposes, and that the load-factor for this portion would be 50 per cent.—that was to say, 30 per cent. would be the load-factor of the whole plant for heating purposes. The remainder of the gas would be used for power, for which he estimated a load-factor of 25 per cent. as favourable. This gave a total load-factor of (say) 38 per cent. for the gas-producing station. The gas would be distributed at pressures suitable for the length of transmission. These were given in a table, which showed that, with only a moderate velocity of 30 feet per second, a transmission length of nearly 80 miles could be reached with a pressure of 44 lbs. per square inch and an efficiency of nearly 90 per cent. A main 4 feet in diameter would, under these conditions, transmit nearly 57,000-horse power—a figure which he ventured to say was quite as high as could be obtained by any electrical distribution. The gas would be led to sub-stations, from which the mains would distribute it to customers at low pressure. At these stations there would be placed the large gas-engines for the production of two or three phase current at a high pressure of from 5000 to 15,000 volts, according to the size of the locality covered. The current required for lighting and traction would be obtained by converters located at suitable spots. The manufacturer requiring power could either be supplied with a polyphase current at reduced voltage, or he could use the continuous current. The use of large gas-engines for the production of polyphase current seemed to be viewed with some suspicion. It might, however, be taken as quite certain that gas-engines of 1000-horse power could be obtained, which would work with such regularity as to enable the alternators to be run in parallel. He knew of one large station of 10,000-horse power which was about to be erected with gas-driven alternators of 1500-horse power each; and he saw no reason to doubt the fact that in the course of a few years it would be possible to obtain gas-engines of from 3000 to 4000-horse power as readily as those of 700-horse power could now be procured. The greatest objection to the transmission of gas under pressure appeared to be a doubt existing as to whether a sufficiently gas-tight joint could be obtained. This was, to say the least, very curious, considering that all engineers were familiar with the hydraulic joint, which remained perfectly tight under pressures of from 700 to 1500 lbs. per square inch. The ordinary joint used in a gas-pipe was, of course, wholly out of the question. The joint would probably be a faced one, and the lengths of pipe would be bolted together with a ring of some flexible material placed between. A very similar joint to this had been in existence on the Paris air-mains for many years; and careful experiment had shown that the leak under a pressure of 100 lbs. to the square inch need not exceed 4 per cent. per mile, and this with a main in which there were many connections to customers. In the pipe-line he had indicated, there would be very few branches and valves; and he was certainly of opinion that modern engineering was quite capable of making a joint in which the leak should not exceed 1-10th of 1 per cent. per mile. The cost of the main was what he would not like at present to speak about in too confident a manner, as so much depended upon the locality in which the pipes were laid; but there was no reason to suppose that it would be as much as for electric mains laid underground, and transmitting the same amount of power. If it were possible to utilize the existing gas-mains, of course the economy would be very considerable.

Professor Burstall concluded by pointing out that an important matter arising out of the general use of gaseous fuel was that a complete solution of the smoke problem would be furnished. Those who lived in smoky cities probably hardly realized the immense sums which were spent for cleaning, due entirely to the use of coal in its solid form. Could this money be saved, there would be a large increase in the national wealth, and—what he ventured to think was of more importance—a considerable increase in the national *physique*. As year by year the population of the country increased, so did the smoke problem become more and more important. The use of gaseous fuel would save from one-third to one-half of the total coal, and would add in no little degree to the comfort and happiness of every individual.

At the close of his paper, Professor Burstall explained a large table which had been prepared to show the efficiency of a scheme for the transmission of gas through a main 4 feet in diameter, taking 70 cubic feet of gas per brake horse power hour. With initial velocities of 20, 30, and 40 feet per second, and an initial pressure of 15 lbs. (absolute) per square inch, the brake horse powers delivered by the main worked out to 13,130, 19,200, and 26,260; the length of transmission being $7\frac{1}{2}$, $3\frac{1}{2}$, and 2 miles; while the efficiency of transmission worked out to 99·7 per cent. On selecting some of the other figures given, it could be seen that 28,300 brake horse power could be delivered 8·6 miles with 99·2 per cent. efficiency with an initial pressure of 1·1 atmospheres—the exhaust in all cases being at atmospheric pressure. With $1\frac{1}{2}$ atmospheres, and a velocity 40 feet per second, 38,750 horse power could be sent 33 miles (or with a velocity of 20 feet per second 19,300 brake horse power could be sent 133 miles) at an efficiency of 96·2 per cent. It was clear, however, from the curves shown, that it would not pay to compress the gas much above $1\frac{1}{2}$ to 2 atmospheres, for at 4 atmospheres, with the same length of main, although 103,200 brake horse power could be transmitted 46 miles with a velocity of 40 feet per second (or about one-half the power, at a velocity of 20 feet per second, to a distance of 182 miles), yet the efficiency of transmission came as low as 87 per cent. With 7 atmospheres it fell to 81·5 per cent., though with a 20-feet velocity upwards of 90,000 brake horse power could be transmitted 196 miles, or almost twice the power about one-fourth of the distance. In all these calculations, the author assumed that the line would be gas-tight, and he neglected leaks of every description.

In the course of the discussion upon the paper,

The Chairman said Professor Burstall had not told them at what figure he proposed to supply the Mond gas; but it had been stated that the price was proposed to be 2d. per 1000 cubic feet. Worked out on the basis that every cubic foot contained 140 thermal units, and that a ton of ordinary engine slack contained 11,000 to 12,000, it would be found that, in order to get the same heat from the Mond gas that would be obtained from the combustion of coal, they would have to pay at the rate of 36s. a ton for the slack. Therefore the use of Mond gas would not effect a saving in the cost of fuel, unless the quantity necessary for carrying on operations could be very much reduced.

Sir Oliver Lodge asked if it was hopeless to produce more ordinary coal gas, of much greater heating power than Mond gas, for the purpose of long-distance transmission. Producer gas was much cheaper than coal gas, but it had only, he believed, one-third of its heating power, and therefore it was very bulky for sending a long way. If it had to be consumed on the spot, or if it was burnt in the factory producing it, well and good; but if it had to be conveyed 133 miles, he should say the interest on the cost of the mains would swallow up the difference in price. Moreover, the coke yielded in its manufacture was almost a waste product. He had long thought the proper method of supplying a town with heat was not to carry coal to it in order to dirty the air and have the ashes to remove, not to choke up the railway with coal-trucks, but to convey that which travelled much more easily—namely, some form of fluid—electricity or gas. They should convert the coal into gas at the pit's mouth, and then let it flow over any reasonable distance, and by means of a pumping-station start it thence again on its journey, instead of trying too much initial pressure, which it was obvious was not economical.

Mr. Bell said it seemed to him that it would be very much more expensive to make a 48-inch main that would be tight than such a main as the author had spoken of. As to large gas-engines, no doubt in a comparatively short time 2000 and 3000 horse power engines would be as common as were steam-engines of these powers now. Deductions from Professor Burstall's figures showed a leakage of producer gas over a distance of 133 miles of rather more than 30 per cent.; and he (Mr. Bell) was not quite sure that with such a leakage the city atmosphere would not be worse than it now was with smoke. The carrying of pipes through land which had been undermined also appeared to him to be a very great difficulty.

Professor Threlfall, as one who had made many hundreds of millions of cubic feet of producer gas, pointed out how difficult it was to say what the cost of manufacture would be in any particular case. The figures quoted by Professor Burstall from Mr. Humphrey would only apply to the conditions of the Midlands in a very remote and general way.

Mr. A. M. Taylor, contending for the superior advantages of electric transmission, said the whole thing hung very much on the vital question of the load-factor.

Mr. C. A. Smith, referring to the future of large gas-engines, remarked that it was rather strange that the exhaustive trials which had taken place had not given a greater impetus to the production of such engines. However, he had been in communication with some of the companies interested in their manufacture, and had heard from the English representatives of one of them that they would actually guarantee a 5000-horse power horizontal engine, four-cylinder tandem, with two cranks, to run with alternators in parallel with a 40-ton fly-wheel. This, however, was a Continental make, and the Company concerned had not any engines actually running yet. With regard to the transmission of gas, Sir Oliver Lodge had arrived at the conclusion that it was best to use moderate velocities; but he (Mr. Smith) had formed quite a contrary opinion. He pointed out to Sir Oliver

that the efficiency of transmission was the same at velocities of 20, 30, and 40 feet per second, though, of course, the length of transmission was different. He also called attention to the tremendous increase in the brake horse power transmitted by the 4-feet main with the high velocities. He ventured to say that, for transmissions over 20 miles, it would pay to use velocities as high as 80 feet per second, because the extra cost of compressors would be less than the additional interest on the main. He had been considering two alternative schemes—viz., the generating of electricity by means of a producer gas station on the coalfield, and transmitting it to sub-stations, and the transmitting of Mond gas to sub-stations to be used for gas-engines located there. Given the same load-factor in each case, he greatly favoured the former scheme, because it enabled good use to be made of the heat of the exhaust gases from the engines, and also because of the greater economy of large gas-engines. But if a considerable part of the producer gas was to be used for heating purposes, the conditions were altered; and if the producer gas obtained a load-factor of 40 per cent., while electricity only had 20 per cent., it was easy to see that the former would have an advantage.

Mr. D. K. Morris thought the cost of a pipe-line for the transmission of gas would be very great as compared with the lowest price of an electric line. It seemed to him that gas power transmission would be rather a suitable thing in the case of corporations who were able to raise money at a low rate, or, generally speaking, when the quantity of gas required to be transmitted was on a fairly large scale, and when it was also possible not to regard interest on capital too much. Though Professor Burstall had not raised the question of cost, he (Mr. Morris) felt they must bring this immediately before themselves to see how they stood.

Professor Burstall, in reply, said he knew quite well that the commercial aspect of the question would be raised, and he was very glad indeed to think he himself had kept clear of it. The Chairman had put his finger on a very important point with regard to the price of gas being equivalent to that of slack at a very high cost. Of course, comparing the amount of heat derivable in the form of lighting gas with coal, it certainly was; but it paid to use a small engine and lighting gas rather than a large boiler and coal. They could afford to pay a very high figure for heat if supplied in a convenient form. He should say the price of producer gas would be considerably less than the amount quoted by the Chairman, if supplied in bulk. Sir Oliver Lodge had in a very happy way raised a question which was constantly being brought forward as to supplying a gas of a higher calorific power. Everybody said: Why make producer gas when more than half of it is incombustible? Of course, gas could be made from coal very much more cheaply than the existing lighting gas, and so could water gas; but in both cases the cost was too great for people to be able to afford to use it in competition with other means of transmission. He had recently to do with an immense transmission extending to 300 miles across what was practically a desert, and the question was whether overhead wires or a main would be best. The main carried it off. What everybody seemed to have forgotten was that the gas-main had a load-factor; but whether it was so in the case of the electric main they did not know, and money could be spent on a main when there was a load-factor of 40 per cent. As to coke, it was a very inefficient thing from a gas point of view; and if wanted for special purposes, it must be made. As to leakage, in America the pipe-lines ran for hundreds of miles, and there was no trouble whatever about the leaks. It was not a serious matter to have a leak in a producer gas main in an open country; and the mains would run over such country and not in towns at this pressure. The question of the sinking of strata due to coal being taken away was, of course, very serious; but this also was capable of solution. It would only be a matter of putting in riveted steel mains, and making proper arrangements for holding them up at intervals. Large gas-engines, which had been alluded to by Mr. Smith, had not come into use to anything like the extent that was anticipated at one time, and the reason was that unfortunately in this country the large gas-driven central station had been a failure. But he did not think that this would occur again. At any rate, there were plenty of engines of immense size on the Continent. Dr. Morris's remarks with regard to the cost of the line were very interesting; but the matter really did not enter into the paper.

A vote of thanks was accorded to Professor Burstall.

GERMAN PROGRESS IN THE RECOVERY OF CYANOGEN.

(*Continued from p.* 827.)

Dr. Nauss proceeds to show that Dr. Knublauch was the first to give directions for the recovery of cyanogen by a practical wet process. But this process, which has been already referred to in connection with Herr Feld's work ("Journal," Feb. 24, p. 480), was not extensively adopted on the practical scale, perhaps because of the comparatively small demand for cyanides at the time it was brought out. As soon as the demand for cyanides increased considerably, owing to the introduction of the Forrest process of gold extraction in the Transvaal, attention was again directed to securing a better yield of cyanides from coal gas; and in a short time two new wet processes for the recovery of cyanogen from gas were introduced. These were the processes of Mr. Foulis, patented in England in 1892, and that of Dr. Bueb, of Dessau, patented in Germany in 1898. Since synthetical processes for the manufacture of cyanides compete with the gas-works methods, it becomes important to see that the latter are established on the most rational basis. With this object in view, Dr. Nauss next describes and discusses some of the processes which have been patented in Germany.

He starts with Knublauch's system, of which it may be well to give some further particulars at this stage. The gas is brought into intimate contact with water or a saline solution containing iron, manganese, or zinc, or oxides, hydrates, or carbonates of these metals, in solution or suspension, and, if the gas is not sufficiently ammoniacal, containing also an alkali, alkaline earth, or magnesia, or carbonate thereof. Thus for every molecule of cyanogen present in the gas, there must be applied approximately one molecule of alkali, alkaline earth (magnesia), or a carbonate thereof, along with less than one molecule of the compounds of the metals named, or a larger quantity corresponding with the smaller reacting power of the earth or metal, along with one molecule of alkali. An alkaline solution of a ferrous salt containing the proper proportion of soda is the most suitable absorbent. The reaction may be represented thus—

(1) $FeSO_4 + Na_2CO_3 = FeCO_3 + Na_2SO_4$

or $FeSO_4 + Na_2CO_3 + H_2O = Fe(OH)_2 + Na_2SO_4 + CO_2$

That is to say, solutions of ferrous sulphate and common soda yield ferrous carbonate or hydrate, which settles out, and sodium sulphate which remains in solution, and may be removed by pouring or drawing off the supernatant liquor. More soda solution has then to be added to the ferrous deposit; but the air has to be excluded, as otherwise it oxidizes the deposit to the ferric condition, and then when cyanogen is absorbed prussian blue is produced instead of the required solution of ferrocyanide. The reaction, when air is excluded, may be represented as proceeding thus—

(2) $FeCO_3 + 2Na_2CO_3 + 6HCN = Na_4Fe(CN)_6 + 3H_2O + 3CO_2$

or $FeS + 2Na_2CO_3 + 6HCN = Na_4Fe(CN)_6 + H_2S + 2H_2O + 2CO_2$

There thus results from the ferrous carbonate or sulphide and the solution of soda, and the hydrocyanic acid in the gas, a solution of sodium ferrocyanide which can be evaporated, or disposed of as such. But, according to the extent to which the iron is in excess of the alkali in the absorbing liquid, an insoluble compound is also produced either as the minor or chief product. This is indicated by the equation—

(3) $FeSO_4 + Na_4Fe(CN)_6 = Na_2Fe, Fe(CN)_6 + Na_2SO_4$

It appears best, on technical and economical grounds, to aim at the production of a solution of ferrocyanide instead of this insoluble salt.

The foregoing equations show that, for six molecules (or 156 parts by weight) of cyanogen in the gas, there must be provided three molecules (= 318 parts) of anhydrous sodium carbonate and one or two molecules (= 152 or 304 parts) of ferrous sulphate. Taking the concrete case of a gas containing 2 oz. of cyanogen per 1000 cubic feet, there are theoretically required about 1·95 oz. of ferrous sulphate (anhydrous) for the formation of the sodium ferrocyanide (solution), or 3·90 oz. for the formation of the insoluble double salt, and in both cases about 4·08 oz. of (real) soda per 1000 cubic feet of gas. Supposing that 90 per cent. soda is actually used, 4·53 oz. of it will be required. The 2 oz. of cyanogen should yield theoretically 3·675 oz. of prussian blue, which, according to Dr. Bueb, is worth at this time, when contained in cyanogen sludge, about 2½d. per pound. The profit to be made per 1000 cubic feet can then be calculated, according to the market price of common soda, 90 per cent. strength; but actually the cyanogen in the ferrocyanide solution is more valuable than the corresponding quantity in sludge. The capital and working charges are about the same for this and for Dr. Bueb's system, which may next be referred to more fully.

The process protected under Dr. Bueb's German patent No. 112,459 of 1898, consists in exposing the crude gas before the ammonia has been extracted from it to a solution of iron of such strength that the water will not suffice to take into solution all the ammonia in the gas, and, on the other hand, that the proportion of iron will be sufficiently great that, in consequence of the ammonia being in excess relatively to the cyanogen, and the iron in excess relatively to the ammonia, the cyanogen will be separated in the form of an insoluble ammonium ferrocyanogen compound. Dr. Nauss explains that consequently, by Dr. Bueb's process, the gas as it leaves the tar-extractor is brought into intimate contact with a saturated solution of ferrous sulphate. The ammonia in the gas serves as the alkali required; and by its action the cyanogen is combined for the most part in the aforesaid insoluble compound, though a soluble ammonium ferrocyanide is also formed at the same time. A further portion of the ammonia reacts with the sulphuric acid of the iron salt, and forms ammonium sulphate therewith. This remains in solution, along with some free ammonia. The whole of this ammonia is lost if the gas-works do not work up their liquor to sulphate But the free ammonia may in other cases be expelled by steam

in a special boiling plant, and the residual sludge (in which all soluble cyanogen compounds will have been converted to the insoluble double salt) pressed in filter-presses, in order to expel the solution of sulphate of ammonia. The cyanogen salts are retained in the form of a blue cake in the filter presses.

The absorption of cyanogen proceeds best with the gas at high temperatures. The train of apparatus should therefore be connected in the following sequence—viz., atmospheric condenser, tar-extractor, cyanogen-washer, water-condenser, scrubbing plant, &c. Consequently there are recovered in Dr. Bueb's cyanogen-washers (which are of the "Standard" type, and are connected directly with the atmospheric condensers), those amounts of cyanogen which are usually lost in the water-condensers. The course of the absorption may be represented by the following equations:—

(1) $2FeSO_4 + 4NH_3 + 2H_2S = 2FeS + 2(NH_4)_2SO_4$.

(2) $FeS + 6HCN + 6NH_3 = (NH_4)_4Fe(CN)_6 + H_2S + 2NH_3$.

But there results chiefly—

(3) $(NH_4)_4 Fe(CN)_6 + FeS = (NH_4)_2Fe, Fe(CN)_6 + H_2S + 2NH_3$.

The last equation indicates that actually the soluble ferrocyanide is converted into the insoluble double salt.

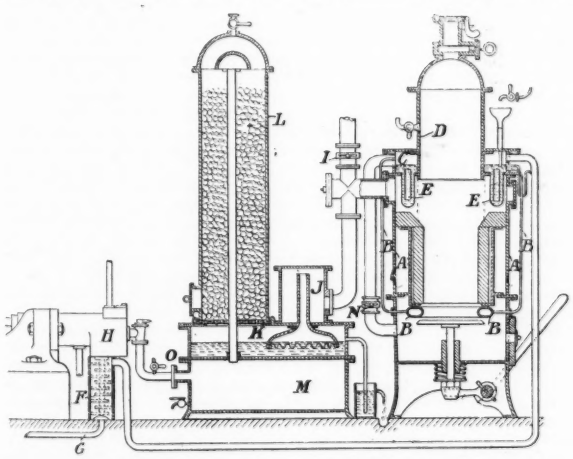
(To be continued.)

REGISTER OF PATENTS.

Gas Producing Plant.—Bowman, F. E., of Manchester. No. 3783; Feb. 14, 1902.

This invention relates to "an arrangement and combination of gas-producing plant for use in direct communication with a gas-engine, the motive power of which is furnished by the gas generated by the plant and drawn therefrom by the engine when at work."

The engraving represents an elevation (partly in section) of the generator, consisting of a vertical metal casing A—preferably cylindrical and lined with fire-clay or other suitable material, below which is an ashpit. In the ashpit is mounted a furnace grate or plate, the position of which is controlled by a hand lever. Below the lining is fitted a coil of pipe B, the ends of which are carried upward—one into the steam space, and the other into the water space, of a small boiler C formed at the top of the generator, and preferably provided with field tubes suspended in a space heated by the furnace. At the top of the generator is a vessel D, preferably of the same diameter as the furnace lining, and at the top of this vessel is a hopper for the supply of fuel to



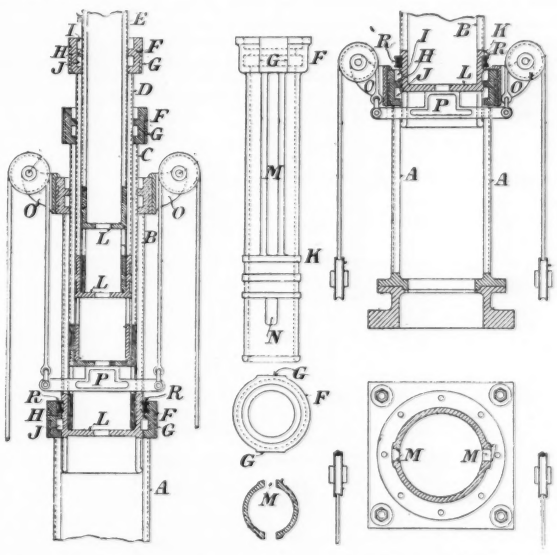
the furnace. A ring of fine gauze prevents coal dust, &c., passing out of the generator with the products of combustion. The air for combustion is preferably admitted at the bottom of a chamber F formed round the exhaust pipe G, close to the cylinder H of the gas-engine; gills on the pipe forming baffles and causing the air to make a tortuous passage, and so absorb heat which would otherwise be wasted. The hot air from the chamber F is conducted to the steam space of the boiler, and this steam space is also connected to the chamber below the furnace. The space below the boiler at the upper part of the generator is connected to a pipe, the upper part of which forms a chimney when a damper I is opened; while the lower end of the pipe enters a vessel J, in which is fitted a pipe with a bell-mouthed opening at the bottom, which dips slightly into water contained in a tank K supporting a scrubber or washer L, the bottom of which is a perforated plate. The scrubber is provided with a central pipe which extends from near the top downward through the water-tank K into an expansion chamber M connected to the cylinder H of the gas-engine.

When the fire is lighted upon the grate, it requires the aid of a hand or other blower (not shown) to start the fire and raise a little steam; the damper I being opened to the chimney, and the damper N being closed. The use of the coiled pipe B, forming an auxiliary boiler in close proximity to the bottom of the furnace near to the point of the ignition of the fuel, enables steam to be raised more readily, and effects a considerable saving of time in starting the engine. When the gas produced is rich enough to burn (which can be tested by opening a valve in the vessel D and applying a light), the valve I is closed, and the gas blown through the scrubber to a tap O. When the gas burns here, the gas-valve on the engine is opened, and the fly-wheel is turned to start the engine. As soon as the engine is properly started, the damper N is opened, and the engine aspirates the gas from the generator and maintains combustion therein. The exhaust gas passing away through the pipe G imparts its heat to the gills shown, which become highly heated; and as the air for the generator is drawn by the suction of the engine through this chamber, it absorbs the heat and passes along with the steam into the chamber below the furnace (which chamber is closed and airtight) and thence upward into, and through, the incandescent fuel in the generator, from which it passes through the ring of wire gauze E into the space surrounding the field tubes, which are thereby heated—the gas, after being washed, passing, in the manner already described, to the cylinder of the engine.

Columns for Gasholders and the Erection of Same.—Lambert, G. L., of Nottingham. No. 7398A; March 27, 1902.

This invention relates to the construction of vertical columns or standards, and in the means for, and the method of, erecting same—applicable to gasholders and other general structures or buildings. The patentee's main specification was summarized last week, p. 833.

According to this part of the invention, the main column or standard is built up of a number of lengths A B C D and E of such varying diameters that the lengths E D C and B can slide in the lengths D C B and A respectively, and can be moved upward one from the other to form a complete main column or standard—the number of the sections for any column depending upon the full length of the main column and the length of each section. The upper end of each section is enlarged to form a socket F; and on the outside of the socket, and at opposite ends of a diameter, there are facings G. Inside the socket there is a central circular rib H, above which is a rectangular packing-ring space I, and below a rectangular recess J. At the lower or spigot end of each column length, there are three bands and an internal partition flange L, below which there is preferably a prolongation of the column length. The distance between the bands is the same as the depth of the packing ring space I and the recess J respectively; and when two lengths of a column are in their permanent position (as represented by the lengths A and B), there is formed a complete packing-ring space, which is truly machined with square butting faces and a complete recess for a cement packing. From the underside of the socket F to the top of the band in each column section, and on opposite sides at the right and left of the column length, there is a parallel rectangular slot M with side strips; and below the other band, there is, on both sides of the column length, a shorter slot N.



When the column lengths have been folded one within the other, the lowest section A, with the other sections inside it, is fixed to the base bed-plate, which is secured to a foundation in the usual manner. The facings G of the column length A are then fitted with removable brackets O, carrying pins or an axle upon which chain or wire rope pulleys are fitted to turn. A cross-bar or cross-head P, of cast-iron, is then passed through the slot M, and the ends of the bars are connected to wire ropes or chains by suitable shackles. The wire ropes are passed over and round pulleys carried from the base or bed-plate; and the ends of the wire ropes from the opposite sides of the column are connected together and to a single wire rope forming a loop like the letter Y. The single wire rope is then attached to a windlass or equivalent appliance by which the whole of the column lengths are raised. The packing ring R is then placed in position on the spigot, and the column length is lowered until the lower face of the ring rests upon the upper face of the rib H, and the lower face of the rib rests upon the upper face; the weight of the upper portion of the column being thus carried by the square butting faces of the ring R, rib H, and band. The cross-bar, wires, brackets, &c., with their pulleys, are then removed, and the sections A and B secured together by radial screw tap bolts, after which the recess J is filled with cement under pressure. The brackets O are then attached to the facings G on the length B, and the cross-bar P is placed through the slots M in the length B, and slots N in the length C to be raised, the ropes are

coupled to the windlass, and the length C is raised to its permanent position and fixed in the same manner as the length B, after which the other lengths are raised in succession.

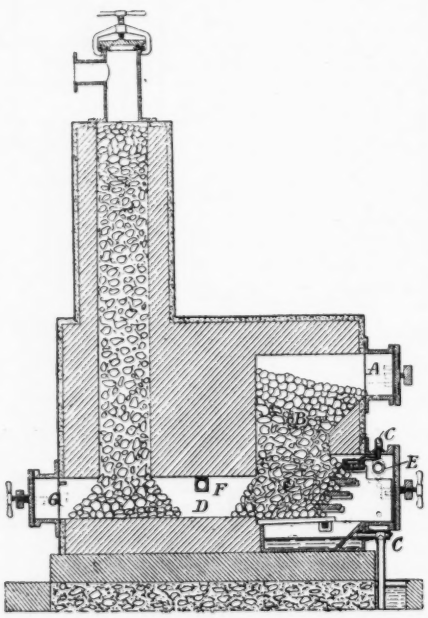
Suspending Device for Moveable Gas-Lamps.—Haddan, R.; a communication from the Allgemeine Beleuchtungs-und Heizindustrie Actiengesellschaft, of Berlin. No. 25,062; Nov. 14, 1902.

With gas-lamps supported by high posts or the like, and adapted to be removed for the purpose of cleaning or replacing incandescence bodies, &c., the patentees point out that the connection and disconnection of the gas-tight joint in the gas-pipe causes considerable difficulty. For vertically moveable gas-lamps, comparatively complicated guides are required to ensure proper connection of the lamp to the end of the gas-pipe, and to allow of easy unfastening and lowering of the lamp. In all arrangements hitherto suggested for this purpose, complicated lever devices are used—more particularly at the point of connection between the lamp and the pipe leading from the main. The present proposal is to have a guiding-device provided at the union with the gas supply-pipe (and adapted to guide the lamp), suspended by means of a cord, chain, or the like; the device having no moveable parts, so that the lamp to be suspended is guided to the proper place solely by the sliding of a supporting pin first upwards on fixed guiding surfaces, and then downwards in a slot. When the lamp is lowered, one or more guide-pieces engage a cross-pin in the support, or place themselves on the pin; so that, when the lowering is continued, the lamp is compelled to move laterally, and the supporting pin cannot slide into the slot of the support.

Manufacture of Compound Producer Gas.—La Compagnie du Gaz H. Riché, of Paris. No. 27,533; Dec. 13, 1902. Date claimed under International Convention, Dec. 14, 1901.

This invention relates to the manufacture of compound producer gas by the combustion of a column of raw (or bituminous) fuel, the gaseous products of which are enriched and purified by a column of incandescent coke or charcoal.

The gas is produced by the combustion of a column of raw fuel under the action of a current of air, which may be mixed with water, or steam, at the base of the column. A mixture of combustible gases is thus formed, which consists of water gas due to the action of the moisture of the fuel, or of injected water, on the carbon in excess, and of gases produced by the partial distillation of the raw fuel. This mixture of gases is enriched and purified by a column of incandescent coke through which the gaseous mixture passes in an upward direction; the gases being reduced, and the smoke decomposed, so that "only permanent purified gases, free from dust, escape from the apparatus." The patentees' present object is to insure the destruction of the tars, and to more effectually prevent the clinker from clogging up the column of coke, by providing, between the column of raw fuel and the purifying column, a free space or chamber, wherein the tars are burned by an additional supply of air, and the clinker is deposited without reaching the column of coke.



A is the feeding inlet, through which the chamber B is filled with a column of raw fuel, the base of which forms the furnace C. At C is provided a pipe delivering water to trays arranged one above the other in the form of steps. E is the blast, or nozzle, for injecting, at the base of the column, the air required for combustion. At the side of the chamber B is arranged a high vertical shaft filled with coke through a hopper. At the top of this column is a pipe for drawing off the gases; while the base of the shaft is fitted with a door G for cleaning purposes. Between the chamber B and the shaft is arranged a horizontal passage or chamber D, at the point F of which air can be injected. This passage compels the columns of raw fuel and coke to spread at their bases and form inclines closing the ends of the passage or chamber.

The gas-producer is started by blowing in an excess of air through the nozzle E until the column of coke in the vertical shaft has become incandescent. Then the air supply through E is adjusted for normal working. Water is injected at C if the fuel does not contain a sufficient amount of moisture of its own.

The gaseous mixture produced at the base of the column in the chamber B reaches the chamber D at a high temperature, ready for passing through the coke column in the shaft. The gaseous mixture receives, however, at F additional air, which destroys the greater part of the tars by partial combustion and dissociation. The velocity of the gases in the chamber D is reduced, on account of its large cross-section, so that dust is deposited therein. As the tars are burned in the chamber D before they reach the purifying column of coke, the latter is never contaminated by either dust or clinker. Its purpose is to transform steam and carbonic acid into combustible gases, while the unburnt tar, or the portion not dissociated, is transformed into permanent gases. The carbon resulting from the dissociation helps to maintain the purifying column.

Special attention is directed by the patentees to the particular conditions under which the second injection of air takes place. It would be prejudicial to the good working of the apparatus to allow this second injection of air to take place within the carbonaceous mass of the dissociating column, as then the result would only be the consumption of a large quantity of carbon and the production of a special current of gas of poor quality due to this combustion. The gases from the furnace which it is desired to purify and dissociate would not take part in the current thus produced, and, travelling separately in comparatively cold regions, would not be affected by the dissociation column in the intended manner.

Manufacture of Water Gas.—Harrison, G.; a communication from the Société Internationale du Gaz d'Eau Brevets Strache, Ste. Ame., of Brussels. No. 28,177; Dec. 20, 1902.

In the specification of this invention, it is remarked: According to the older processes of manufacturing water gas, it has been the endeavour, during the period of heating the generator by the aid of the blast, to attain a high temperature, in order to be able to decompose a large quantity of steam during the period of gasification. This high temperature has been reached by a long continued blast (lasting for about 10 minutes), whereby, owing to the combustion of the carbon at the high temperature, carbonic oxide is formed; the gas leaving the generator containing only about 2 to 5 per cent. of carbonic acid. The large quantity of carbonic oxide escaping during the application of the blast unfavourably influenced the efficiency. Dellwik, in his process of producing water gas (German patent No. 105,511), proposes, by a high air pressure and thin layer of fuel, to form carbonic acid directly by combustion of the coal, and thereby to attain a higher degree of efficiency. It has been proved, however, that the formation of carbonic acid depends essentially upon the temperature of the generator, and that the complete combustion to form carbonic acid, or even only such combustion as Dellwik requires—viz., that the products of combustion shall contain more carbonic acid than carbonic oxide—is only possible at a very low temperature. So low a temperature, however, is liable to cause loss of heat by steam escaping undecomposed, and by the large loss of heat due to radiation from the apparatus relatively to the small amount of water gas generated. It has been further shown: (1) That a moderate temperature of the generator—*i.e.*, from 750° to 1000°—when a certain rate of steam supply is regularly maintained yields the highest degree of efficiency. (2) That the gases of combustion at this temperature always contain more carbonic oxide than carbonic acid—viz., 12 to 16 per cent. of carbonic acid and 15 to 25 per cent. of carbonic oxide; but that at this temperature the loss of heat through the formation of carbonic oxide, on account of the short period of blast, exercises no appreciable influence on the output. (3) That the efficiency depends essentially upon the proper gasification; so that, at the temperatures named, the principal point to keep in view is not the blast but effective gasification.

Thus, while in the older processes a blast was maintained, the patentee proceeds, in such manner that almost only carbonic oxide was produced, and Dellwik, on the contrary, only proposed such blast as forms almost exclusively carbonic acid, the most economical process is the mean between these—*i.e.*, to maintain those temperatures at which, during the blast, at the most 12 per cent. of carbonic acid and more than 15 per cent. of carbonic oxide is produced.

Naturally, the carbonic oxide produced can be employed for heating a regenerator for superheating the steam, heating the air, evaporating water, and like purposes.

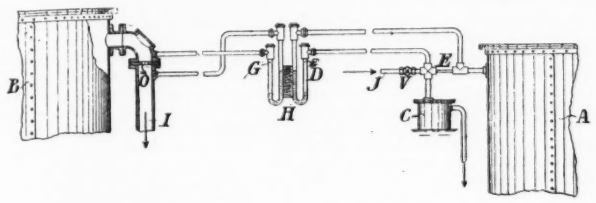
The following summary shows the calorific conditions for a moderate temperature of 780°:—

On application of the blast with 5·6 cubic metres of air, 0·445 kilogramme C are consumed and produce CO_2 and yield	3580 cals.
and	
0·556 kilogramme of C are consumed producing CO and yield	1375 cals.
Total heat produced	4955 cals.
On gasification, 6·2 cubic metres of gas are obtained and 1·580 kg. of C are consumed in producing water gas containing 5 per cent. of CO_2; there being consumed Total 2·581 kilogrammes of C	3530 cals.
In addition there is lost:—	
During application of blast, through 6·05 cubic metres which escape owing to the short period of blast with the temperature of the upper layer of coke (taken as 250°)	500 cals.
During gasification, through the heat of the water gas and of the undecomposed steam (taken as 300°)	613 ,,
Radiation of the apparatus during blast and gasification	312 ,,

The efficiency therefore, since 1 cubic metre of water gas with 5 per cent. of CO_2 has 2644 calories heat of combustion, is

$$\frac{\text{Consumption of heat . . . . 4955 cals.}}{\frac{6{\cdot}2 \times 2644}{2{\cdot}581 \times 8080} \times 100 = -78{\cdot}5 \text{ per cent.}}$$

Since it has been ascertained, now, that proper gasification depends essentially upon a suitable rate of steam supply, it is pointed out that the following is to be observed: Ideal gasification would be the generation of 2 cubic metres of water gas for each cubic metre of steam. This, however, cannot be attained in practice, since there is always a certain amount of carbonic acid and undecomposed steam escaping with the water gas. There have, moreover, hitherto been no reliable means of indication of the quantity or quality of the water gas produced; the so-called test-flame being exceedingly unsatisfactory, owing to its indicating only large quantities of carbonic acid and steam.



Even though carbonic acid and steam cannot be wholly excluded from the water gas produced, it is nevertheless possible, by maintaining a rate of steam supply suitably proportioned to the temperature of the generator, to permanently reduce to a small amount the two impurities, despite variations of temperature in the generator. Thus, by means of two meters (one for measuring the velocity of the steam and the other the velocity of the gas), the gasification can be so conducted that practically the whole of the steam let in can be converted into satisfactory water gas. The meters are so adjusted and set that on the whole of the steam being converted into water gas (as is now practically possible), the meters stand at the same division line. If, then, much undecomposed steam is given off from the gas, the velocity of the gas will decrease relatively to the velocity of the steam—firstly because the undecomposed steam will be condensed and its volume as gas diminished, and, secondly, because at the higher velocity of the steam the decomposition goes on according to the formula $2H_2O + C = CO_2 + 2H_2$; and therefore from two volumes of steam only three volumes of $H_2 + CO_2$ are given off, while with normal decomposition there would be four volumes of water gas produced. In addition to the higher efficiency of this process, it is said to have another advantage—viz., that the water-gas process goes on quantitatively according to a physical method.

One form of apparatus suitable for carrying out the process is illustrated in side elevation and part section—portions of the generator and scrubber being removed. A is the generator, and J the steam inlet-pipe controlled by a valve V. C is a steam trap having a discharge pipe for the water. E is a narrowed passage in the steam-pipe; the loss of pressure caused by this passage being indicated by a pressure-gauge D. B is the scrubber; I, the gas outlet-pipe; O, a narrowed passage in the latter; and G, a pressure-gauge indicating the loss of pressure caused by the passage. The two gauges D and G have a common scale H. The sections of the passages E and O should preferably be so selected that, should two volumes of water gas flow from the scrubber for each volume of steam flowing into the generator, both gauges stand at the same division line on the scale—that is, at the same height. Since, however, it is advisable to work with a greater loss of pressure in the steam-pipe than in the gas-pipe, the steam-gauge should preferably be filled with mercury; while the gas-gauge (as is usual) is filled with water. During gasification, the steam-valve V should always be so set that the level of both gauges is the same. Any difference of level indicates the escape of undecomposed steam—that is, shows that the velocity of flow of steam is too high.

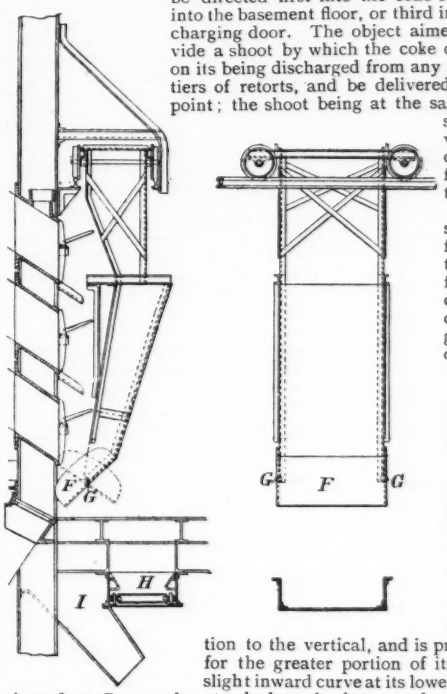
Self-Igniting Incandescent Bodies for Gas Lighting.—Peters, T., of Düsseldorf. No. 609; Jan. 9, 1903.

The patentee remarks that it has been proposed to gradually build up the temperature of ignition by means of a bundle of cotton threads impregnated with rare earths; the cotton threads being impregnated in varying degrees with suitable platinum salts. In the case of flat-flame burners, the bundles were mounted sideways; and in the case of incandescence lamps they were fixed to the holder of the incandescence mantle or to the cylinder. Sometimes a strip of textile fabric was used, instead of a bundle of threads; the solution of a metal of the platinum group being applied to the upper end of the strip in the most concentrated form, and the strength of the solution gradually decreasing towards the lower end. The strips were provided with platinum black at the upper end. They, however, had the defect that, when applied to an incandescence mantle, they hung more or less loosely, and were subject to excessive motion at the time of igniting the lamp.

The present invention has for its object to avoid this defect, by gradually generating the igniting temperature, not on a separate object—such as a bundle of threads or strips of woven fabric—but on the incandescence body itself, and rendering the latter self-igniting. For this purpose, platinum black is applied to one or more points of the crown of the mantle; and the platinum solution is applied to the mantle in the shape of lines or dots emanating from the platinum black, and made with platinum solution of varying strength. As a modification, very thin platinum solution may be applied to the whole or to part of the mantle; and the strength of the platinum solution can be made to gradually decrease along lines or spots or rings emanating from the platinum black, so that the impregnation of the incandescence body represents the last and weakest concentration of the solution. In this manner, the dull red heat of the platinum black is gradually increased to white heat along lines, spots, or other figures emanating from the platinum black, and gradually becoming poorer in metallic platinum.

Discharging Inclined Gas-Retorts.—Graham, M., of Leeds. No. 824; Jan. 13, 1903.

This invention relates more particularly to movable shoots by which the coke, on being discharged from the retorts, may be received and be directed first into the coke-conveyor, second into the basement floor, or third into the producer charging door. The object aimed at is "to provide a shoot by which the coke can be received, on its being discharged from any one of the three tiers of retorts, and be delivered at the desired point; the shoot being at the same time so constructed as to be without complications and free from any liability to choke up."



The shoot is suspended in front of the retort mouthpieces from a movable carriage mounted on wheels and guided by rails over the front of the retort-bench. The shoot is three-sided, and is open towards the front—that is to say, it is open throughout its length on the side adjacent to the retort mouthpieces. It is arranged in an approximately vertical position, or at a slight inclination to the vertical, and is preferably straight for the greater portion of its length, with a slight inward curve at its lower end. A shoe F, pivoted at G, may be attached to the lower end of the shoot, and made movable about its pivot, so as to direct the coke, as required, into either the conveyor trough H, the shoot I leading to the basement floor, or to the producer charging door.

APPLICATIONS FOR LETTERS PATENT.

6438.—Tweedale, E. & S., and Smalley, J., "Stoppers for gas-producers." March 20.

6444.—Cherry, C. E., "Supporting or assisting in holding or supporting incandescent mantles." March 20.

6463.—Bestwick., G., "Incandescent gas-mantles." March 20.

6506.—Weichelt, C., "Steam or gas turbines." March 20.

6519.—Page, S. H., and Priestley, S., "Timing of ignition in internal combustion engines." March 20.

6524.—Graham, M., "Hot-coke conveyors." March 20.

6527.—Schwab, M., and Greene, H, and Sons, Ltd., "Incandescent gas-burners." March 20.

6544.—Boult, A. J., "Gas-meters." A communication from La Compagnie pour la Fabrication des Compteurs et Matériel d' Usines à Gaz. March 20.

6646.—M'Mullen, J. A., and Willans and Robinson, Ltd., "Gas-engines." March 21.

6676.—Chandler, S. & J., "Retort mouthpieces." March 23.

6685.—Grafton, W., "Argand burners for gas testing." March 23.

6696.—Boult, A. J., "Incandescent gas-lamps." A communication from J. & G. G. Doorenbos. March 23.

6697.—Silbermann, A., "Burners for incandescent acetylene gas-light." March 23.

6732.—Lake, H. H., "Mixing air and gas for illuminating purposes." A communication from "Selas" Gesellschaft m. b. H. March 23.

6782.—Morrall, J. B., "Gaseliers." March 24.

6845.—Schwartz, M. J., "Incandescent gas-mantles." March 24.

6856.—Dick, F. W., "Controlling the gas supply to furnaces." March 24.

6900.—Johnson, J. C., "Self-feeding horizontal or inclined conveyor." March 25.

6934.—Gehre, M., "Measuring the fluctuations of pressure in pipes." March 25.

6944.—Touché, E., "Gas blow-pipes." March 25.

7040.—Shepherd, J., "Gas and other engines." March 26.

7076.—Porter, R. C., "Indicating and recording the percentage of any particular gas or gases present in mixed gases." March 27.

7164.—Mills, B. J. B, "Gas-stoves." A communication from D. J. Clark. March 27.

7167.—Glover, W. R., "Coin-freed apparatus." March 27.

7187.—Bartlett, J., "Inverted incandescent gas-lamp." March 27.

7198.—Schmidt, G. J., "Bunsen burners." March 27.

7251.—Gibbons, G. B. A., and M'Ewen, C. J., "Inclined gas-retort mouthpieces." March 28.

7252.—Gibbons, G. B. A., and M'Ewen, C. J., "Coal-stoppers for inclined gas-retorts." March 28.

7272.—Booth, A. T., "Generating acetylene gas." March 28.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Blue Water Gas at Ilford—and Elsewhere.

SIR,—It was formerly my intention to ask you to be good enough to insert in the "JOURNAL" a short statement compiled from the carefully-kept records of the working of the Dellwik water-gas plant at West Bromwich; but in view of the fact that what promised to be a most interesting and instructive discussion has ended in mutual recriminations, I think no good purpose would now be served by making such a request. I was exceedingly glad, however, to hear from a well-known gas engineer a few days ago that, on behalf of your readers, it was your intention to make an independent inquiry into the actual merits of each system. If my information is correct, I need hardly say that I shall be most happy to place all our records at your entire disposal for such a purpose.

Having had what is probably an almost unique experience in this country of both systems, I have a perfectly open mind on the question—not having been responsible for the introduction of either. I am convinced that each has its own particular advantages, which circumstances can alone determine. But I very much regret that the credit of such a useful and profitable adjunct to a gas-works as the Dellwik plant undoubtedly is should suffer from the effects of wild statements derived from inadequate data.

HAROLD E. COPP.

West Bromwich, April 4, 1903.

[With reference to Mr. Copp's letter, his informant is labouring under a misapprehension as to our intention to make "an independent inquiry into the actual merits of each system." Indeed, it would not come within the province of the "JOURNAL" to undertake such work. Probably the confusion has arisen in connection with the announcement made by Mr. J. H. Brown, in the letter published in the "JOURNAL" for the 24th ult., that he has put down at Nottingham a complete testing plant, in order to thoroughly investigate the claims of the "Lewes" process. In that letter, Mr. Brown says he would be "delighted to welcome Mr. Glasgow (or any other gentleman) to Nottingham to take part in these tests; and he would thus have an excellent opportunity of demonstrating the relative value of the two processes, and of setting at rest once for all this very vexed question." We sincerely hope that Mr. Glasgow or some other gentleman will accept Mr Brown's invitation, and also that, in the meantime, Mr. Copp will not withhold his records, but will incorporate them in a communication for publication in the "JOURNAL." It would, we can assure him, be heartily welcomed.—ED. J.G.L.]

SIR,—It is refreshing to turn from the squabbles of rival manufacturers to the interesting descriptions by *bonâ fide* users of water-gas plant. It would appear that the present is a suitable opportunity to probe to the rock-bottom of the cost of water gas, and to disentangle that product from the process of carburetting, which should be dealt with quite as a supplementary matter. No doubt Mr. Brockway, of Cleethorpes, and Mr. Stephenson, of Tipton, possess the necessary experience and data; and as these gentlemen appear disposed to give information through the medium of your valuable journal, perhaps they will make a little clearer the methods by which they arrive at the results set forth on pp. 758 and 771 of the number for March 24.

Assuming a 24-hour output of 250,000 cubic feet of 18-candle power gas, it seems desirable to trace the operations and their cost by a step-by-step process. Taking the blue water gas first, we should know—

(*a*) The cost and quantity of coke for generator.

(*b*) The cost of fuel for steam-boiler for steaming the generator and furnishing the blast.

(*c*) The wages of stoker, gas maker, and engine tender, with other labour; stating if two or three shifts for continuous work.

(*d*) A fair proportion of foremen's wages.

The output of blue water gas (as distinguished from the ultimate volume to which the carburetting contributes) should be given; and an analysis of this blue water gas taken haphazard during the *full working* of the generator is important, together with a calorimeter test. It is quite easy to show a high result by slowly working a generator, whereas in full work the carbonic acid, free hydrogen, and nitrogen creep up, and should not be concealed by a douche of hydrocarbon.

Having independent details of the water gas itself, it will be interesting to pass on to the carburetting stage, for which the cost of oil per ultimate 1000 cubic feet and the labour (if any) may be taken separately; and not only the ultimate candle power of the gas, but also its dilatation, due to the decomposition of the oil, should be stated.

If these particulars can be obtained from such undoubted sources as I have named, much will be done to clear away the mystery at present surrounding blue water gas. Such matters as purification, establishment, and capital charges can be easily estimated.

In submitting this communication, I wish to lay special stress on the fact that the cost of steam supply is frequently overlooked by makers of gas-producers when they read papers before scientific institutions.

HOWARD LANE.

Hyde, March 30, 1903.

P.S.—5s. per 100,000 cubic feet of gas for labour seems extremely low.

Reduced Price for Power Gas at Nottingham.—The Gas Committee of the Nottingham Corporation last Wednesday resolved to reduce the price of gas for power purposes to 1s. 6d. per 1000 cubic feet, if the consumption is more than 500,000 cubic feet per annum, and to 1s. 10d. if less than this quantity is used. The ordinary price is 2s. 10d. per 1000 cubic feet.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

COMMITTEE work, so far as our special interests were concerned, fizzled out altogether early last work; and for a space extending a little beyond the Easter recess, we have no hope of finding anything to engage attention in this particular sphere. Then for a time curiosity and interest will be brought up to high-water mark over the London Gas Bills; and one or two of the Provincial gas measures promise to be a little entertaining. In water, the Oldham Corporation Bill, which is intended to authorize them to purchase the water undertaking of the Deanhead Reservoir Commissioners and to construct additional works, is to be contested very vigorously and from many quarters—the petitions lodged in this instance numbering no less than seventeen. As to the past week's work, the only gas measure dealt with in Committee was the Walker and Wallsend, and the only opposed point was that of the enfranchisement of the existing site of the gas-works and the compulsory purchase of additional land. It is expected that this question—the Company having been successful in the Commons—will be fought again before a Lords Committee. One Water Bill—the Sutton—was passed through Committee; and a few Bills were dealt with by the Unopposed Bills Committee on Monday. This is a very meagre record for this period of the session. However, as explained in the last two issues, it is not by any means due to any debility in the gas industry, but is entirely owing to the wholesome settlement of disputes between promoters and opponents outside the Houses; and this, in more ways than one, is to the public advantage.

Leasehold or Freehold. It is a well-established principle that such manufactories as gas-works should be erected on freehold land. In the early days of gas supply, the rule was not always observed; but it would be a grave departure from present-day gas policy for an engineer to suggest the setting up of a gas-works on any ground but such as was, or would be, the absolute and perpetual possession of the proprietors. The Walker and Wallsend Union Gas Company are one of those concerns whose works were in the old days built upon leasehold land, and the lease is due to expire in a little more than thirty years. The growth of the business now demands the extension of the works; and for this purpose, and for the construction of a railway siding, more land is needed. Under the circumstances, the time is opportune, and the proposal a legitimate and reasonable one, for the Company to seek the enfranchisement of the lands now occupied, and the compulsory purchase outright of the additional lands that they require, paying full compensation to the ground landlords—the Newcastle Corporation—for the loss of the ground-rent of the present occupied site and for the reversionary interest. The Company are asking the permission of Parliament to do these things in the many-sided Bill they are promoting in Parliament this year; and the land clauses were the only ones opposed—the opponents being, of course, the Newcastle Corporation. The Local Authorities concerned in the other parts of the Bill had petitioned against it; but, as was stated last week, their requirements had all been satisfied. Therefore, the only matter which had to engage the attention of Sir Aubrey-Fletcher's Committee when the measure reached them on Monday last week were the land proposals; and these were sufficient to occupy the greater part of the sittings on Monday and Tuesday, and a little time on clauses on Wednesday. The case for the Company was extremely well handled; and step by step the witnesses for the Company—the three first of whom were, in the order called, Mr. A. B. Walker, the Company's Engineer, Mr. Charles Hunt, and Sir George Livesey—showed that it was against the best interest of both the Company and the consumers that the present condition of things should continue. It should be mentioned—and this is one of the peculiar points in the case—that the Newcastle Corporation, as a municipal body, have nothing whatever to do with the district served by the Walker Company; but they are extensive landowners outside their own administrative limits, and, in fact, are the ground landlords of practically the whole of Walker. They objected entirely to the forcible conversion of a comparatively small piece of their property into a freehold, to their forcible deprivation of their reversion, and to the compulsory purchase of fresh land. Very properly, the Committee, after an unrestrained hearing on all points affecting the matter, were convinced as to the righteousness of the powers sought, and declared themselves accordingly. Notwithstanding an announcement by the Chairman that it would be well if Counsel for the Corporation saw a clause was inserted in accordance with a report sent to the Committee by the Local Government Board, providing for the application of the money received by the Corporation for the land, Counsel was obdurate, and would not take part in any adjustment of the clauses. This is a clear indication of the intention of the Corporation to resist this little indentation of their land-owning rights in the Upper House.

Sutton Water Opposition Settled. The consideration of the Bill promoted by the Sutton Water Company was a pleasant and brief matter for the same Committee after the attention that the strongly contested clauses of the Walker Bill demanded of them. The Sutton promoters and petitioners, it now appeared, had almost settled their differences; and they were not long in bringing them into entire harmony when before Sir Aubrey Fletcher and his colleagues. The district supplied by the Sutton Company has grown considerably of late; so much so that since 1885 the quantity of water pumped has increased from 262 million gallons to over 460 millions last year, and this makes imperative the sinking of a new deep well and the construction of storage reservoirs. The former it is intended to put down at Woodmansterne, and the latter in the pretty neighbourhood of Banstead. For these purposes, and for future expenditure, additional capital to the extent of £100,000 was asked, with one-fourth borrowing powers. There was no objection to the sites of the new works; but the main thing the petitioners wished to secure was the softening of

the water—both from the old and the new wells. The Company willingly met their opponents on this point, though it will entail an expenditure estimated at £50,000; and they asked, as they were fairly entitled to do, to be allowed to increase the new capital to that extent. They also agreed to carry out the necessary softening works by Aug. 1, 1906. There were other matters in dispute; but after the opening by Mr. Freeman, K.C., and the hearing of the evidence of Sir Allen Sarle, the Chairman of the Company, the other questions were also amicably agreed. Their nature will be seen from the settlement. The Company consented to the maximum charge for water supplied by meter for trade purposes being fixed at 10d. per 1000 gallons (under the original Act no price was stipulated), and for water for public purposes at 7d. At Sutton, the price at present charged for water used for public purposes is on a sliding-scale, and at Carshalton it is 10d. It was also agreed that where houses are partly occupied for trade and partly for residential purposes, there shall be a discount of 25 per cent., where the rent is between £20 and £50, and of a third where it is above the latter amount. These and two or three other concessions, though not meeting all the minor points touched by the opponents, pleased them greatly; and they withdrew from further antagonism. This adds another Bill to the long list of unopposed measures now going forward.

HOUSE OF LORDS.

The House rose for the Easter recess on Monday last week, on which day the Plymouth and Stonehouse Gas Bill was read the third time, passed, and sent to the Commons.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords and read the first time: Nantwich Urban District Council Bill, Plymouth and Stonehouse Gas Bill.

Bills reported, with amendments: Broadstairs Gas Bill, Burgess Hill and St. John's Common Gas Bill, Ipswich Gas Bill, Market Drayton Gas Bill, Sutton District Water Bill, Walker and Wallsend Union Gas Bill.

Bills read the third time and passed: East Ardsley Gas Bill, Winchester Water and Gas Bill.

The Commercial Gas Bill, Crystal Palace District Gas Bill, Gaslight and Coke Company's Acts Amendment Bill, Gaslight and Coke Company Bill, and London County Council (General Powers) Bill have been referred to a Select Committee, consisting of Sir John Brunner (Chairman), Sir H. Seton-Karr, Mr. Priestley, and Mr. James Heath; to meet on Tuesday, April 28.

HOUSE OF COMMONS COMMITTEE.

Monday, March 30.

(*Before Sir* H. AUBREY-FLETCHER, *Chairman*, *Mr.* J. A. DEWAR, *Mr.* MACONOCHIE, *and Mr.* TOULMIN.)

WALKER AND WALLSEND UNION GAS BILL.

This Bill is to obtain powers to enlarge and extend the existing works of the Company at Walker, construct a short line of railway or siding into their works, raise additional capital, and for other purposes.

The Hon. J. D. FITZGERALD, K.C., Mr. E. MOON, K.C., and Mr. E. SHORTT appeared for the promoters. The only petitioners, the Newcastle-upon-Tyne Corporation, were represented by Mr. PEMBER, K.C., and Mr. ACWORTH.

Mr. FITZGERALD, in opening the case, said the district supplied by the Company extended from Newcastle along the north of the Tyne almost to Tynemouth, and comprised the urban districts of Walker, Wallsend, and Willington, and a portion of the parish of Willington. Formerly there were two Companies in the district—one, the Willington Gas Company, which belonged to private individuals, and the other the Walker and St. Anthony Gas Company, Limited. Neither had any parliamentary powers; but in 1866 the existing Company was formed under an Act of Parliament to take them over. In 1884, they obtained further powers; but since that time the consumption in the district had largely increased, so that the Company had got to the end of their tether. In 1891, the population of the district was 29,943, whereas in 1901 it was 42,195; and the gas made had increased from 70½ million cubic feet in 1884 to 107 millions in 1891 and 222 millions in 1901. It was, therefore, absolutely necessary to increase the works and make provision for further large expenditure in the next ten or twelve years. Adjoining the existing works at Walker was a piece of land which the Company proposed to acquire in order to extend their works. The existing works at Walker were built before the Company obtained statutory powers, and so were erected on leasehold land, the lease of which expired in 1936. Obviously this was a state of things that could not be allowed to go on, in the interests either of the consumers or the shareholders; and therefore it was proposed to take power to acquire the reversion after the expiration of the lease. The position at the Company's works at Willington was similar; the only difference being that there there were two leases—one expiring in 1936 and the other in 1951. The ground rent of the Walker works was about £20, and in the case of the Willington works it was a little more. In connection with the Walker works, authority was sought to make a short siding connection with the North-Eastern Railway, from which they were distant only about 150 yards. At present the coal had to be delivered at a siding about a quarter-of-a-mile off and carted thence to the works. The Willington works adjoined Willington Gut, a creek leading from the River Tyne. On the creek was a jetty connected with the works by a gangway, along which the coal landed was conveyed. The gangway had been there for 20 years; but the Company had no right to keep it, and were liable to have it removed at six months' notice. This was very undesirable, and power was therefore sought to maintain it. These were the matters as to which there was any opposition. Certain other proposals connected with the illuminating power of the gas, the sliding-scale, &c., had all been the subject of amicable negotiation with the Local Authorities, with the result that amendments satisfactory to all had been agreed, and would be imported into the Bill. The only opposition came from the Corporation of Newcastle—the ground landlords of practically the whole of Walker. They were not concerned, however, as a municipal authority with any municipal duties or with any special rights. The site of the existing works and the land which it was proposed to acquire belonged to them. It seemed that the Corporation had taken up an impossible position, because they said that the Company ought not to be allowed to acquire the reversion of the existing works or any portion of their land without their consent. Here, however, the Corporation were in no different position from that of any ordinary landowner. In this connection, Counsel pointed out that it had always been recognized that where works of public utility for the general advantage of a district had to be carried out, the promoters were quite entitled to take the land, unless some special reason could be shown to the contrary. The position the Corporation had taken up was that because these works were built on leasehold land, compulsory power to acquire the reversion ought not to be given. He should have thought that the case where the exercise of compulsory powers would cause the least possible inconvenience to anyone was that in which the persons asking for them had an existing lease with some 30 years to run, and were in possession of the land, so that no one was disturbed either in his occupation or business by the grant of the compulsory powers. Of course, the Corporation would receive compensation for the ground-rent and for their reversionary interest; no one would be disturbed; and the only difference would be that the cash value of the interest of the Newcastle Corporation would be paid to them. The position was exactly the same at the Willington works. The additional piece of land which the Company proposed to acquire at Walker was eminently suitable for the extension of gas-works, because it adjoined those now existing, on the other side of it was the Walker Colliery, while in the neighbourhood were cottages occupied by workmen; and it had been found, by long experience, that no deterioration of such property occurred by the establishment of gas-works close at hand. Counsel then referred in detail to the petition of the Corporation, after which evidence was called.

Mr. *A. B. Walker*, Engineer and Manager of the Company, said the capacity of the works at Walker was roughly 75 million cubic feet per annum, and of those at Willington Quay 150 millions. About 33 per cent. of the gas was made at Walker; but the consumption there was about 39 per cent. of the whole—the balance being at Willington. The new capital asked for was £160,000. The works at Walker needed enlargement; those at Willington having been developed as far as possible. The Corporation of Newcastle had prepared a plan showing a building scheme for utilizing the land close up against the wall of the existing gas-works at Walker by the erection of houses; so that it did not look as if they thought there was much disadvantage in having houses near the gas-works. This plan was made in 1892. The Walker works were very much confined. To meet future demands, the area of the purifiers should be eight times what it was at present; and if this area were provided, all nuisance from foul lime would be practically obviated. There was very little offensive smell from well-conducted gas-works. The gangway over which the Company ran their coals and waggons from Willington Gut to the Willington works was about 130 feet long. At present it was supported on a trestle arrangement, which naturally blocked up a considerable part of the road. The Company had agreed with the Local Authority to put standards on either side of the roadway, bridge across it with girders, and run their rails on top. The existing height would be increased from 8 feet to 11 ft. 6 in.; and a movable bridge in connection with the work would be at least 15 feet high when raised. The road was only used by the Company, though there were some works near.

Cross-examined: The gangway as proposed would not block the roadway at all. None of the gas was made at Wallsend; but Wallsend used about one-third of the total make. It was proposed to take an area three times as large as the site of the existing gas-works.

Re-examined: It would be exceedingly inconvenient to have the works split up into several units. It was better, in everyone's interest, to extend gas-works rather than erect additional works elsewhere.

Mr. *Charles Hunt* gave evidence in support of the Bill. He estimated that the consumption of gas in the area would probably increase by from 260 to 300 million cubic feet in the next twelve years; and to meet this it was necessary to extend the works as proposed.

Cross-examined: He could not cite an instance in which Parliament had given compulsory powers to a gas company to put works in the middle of an estate of 1100 acres in a ring-fence, against the opposition of the owner of the estate; nor did he know a precedent for a gas company obtaining a lease of land on which to erect works, and then enfranchising themselves. It would be most undesirable to sever or remove the existing works. It would be very unjust to hold the Company to their bargain, and thus force them to leave the Walker site at the end of their lease.

By the COMMITTEE: It was very unusual for gas-works to be erected on leasehold ground. He knew of only one instance—Redditch—and there the Company had, by agreement, recently acquired the freehold. The life of gas plant was about 60 years; but the present works, established in 1861, were not worn out, because they had been constantly renewed.

Sir *George Livesey*, examined by Mr. SHORTT, said it was a wise thing to keep gas-works as far as possible in one spot. In this case, he should advise an enlargement of the Walker works, having regard to the interests of the shareholders and consumers, which were identical. The larger the area of gas-works, within reason, the more conveniently the process of manufacture could be carried on, and the less the

liability to nuisance. It was essential that coal should be brought as near as possible to the works, and by the cheapest carriage.

Mr. SHORTT: Do you think it advisable, in view of all the circumstances, that this Company should have the freehold of the land upon which their undertaking is situated?

Witness: In almost all cases, gas companies get the freehold; and I think it very advisable and highly necessary.

I suppose you know or have heard of cases where they have obtained compulsory powers to purchase?—It is a common thing; they usually go for compulsory powers to purchase whenever they want additional land.

The CHAIRMAN: Do they get them?

Witness: Nearly always.

Cross-examined by Mr. ACWORTH: In the case of the South Metropolitan Company last year, the Company were looking very far ahead—25 years; but they obtained nearly all the land they sought. Though the works might need renewing to a considerable extent, it would cost more to go to a new site than to continue on the existing one, because in the former case everything would have to be new.

Mr. DEWAR: You say it is usual for gas companies to get compulsory powers?

Witness: Almost invariably.

But you do not know of a case of a leasehold being turned into a freehold by compulsory powers?—There have been such cases; it is an ordinary thing for a company to ask.

I do not think there is much difference between the two?—There is this difference—that the gas-works are already on the land, so that there cannot be the objection to bringing them there.

Mr. *John Lamb*, a surveyor and valuer of Newcastle, said the land surrounding the area proposed to be taken at Walker was not largely covered. It had been laid out as streets, and, where built upon, the houses were entirely those of workmen. These houses had come to the gas-works, and in some cases were touching them. The works at Willington were bounded by manufactories or back streets. He did not think the people living near the Walker works cared one straw whether they adjoined gas-works or not. In order to raise money cheaply, it was desirable that the works of the Company should be on freehold land.

Mr. *Joseph Oswald*, an architect and surveyor of Newcastle, gave evidence in support of the Bill.

Mr. *Thomas Miller*, a naval architect and shipbuilder in the service of Sir W. Armstrong, Whitworth, and Co., said he was engaged at their Walker establishment, and for nine years had apartments in a block of buildings quite close to the gas-works. There was a great demand for these houses, and the fact that they were near the works did not interfere with it. The proposed extension of the works would not in the least affect the value of the adjoining land for residential purposes.

Mr. *C. H. Armstrong*, Secretary of the Company, stated that he had given notice of the proposal to take land to all owners, lessees, and occupiers within 300 yards. He had only received a dozen dissents—four from lessees and eight from occupiers.

Cross-examined: He sent out 785 notices to occupiers and lessees; but he could not say how many assents he received.

Tuesday, April 1.

On the resumption of the proceedings to-day,

Mr. PEMBER addressed the Committee on behalf of the Newcastle Corporation, who he said, with the exception of some 50 acres, owned the whole of the 1156 acres comprising the district of Walker. The development of Walker therefore was to them a matter of very great importance. They also owned about one-third of Willington, and the whole of its river frontage. The conversion of the leasehold into a freehold, as proposed, was absolutely without precedent. Mr. Fitzgerald objected to a statutory Company holding works on leasehold ground; but in 1866 the Company turned themselves into a statutory concern, on the basis that their tenure of the gas-works was only to be leasehold. Why did they not negotiate for enfranchisement then? Under their Act of 1866, moreover, they had power to purchase the reversion of the Newcastle Corporation by agreement; yet they had never tried to use that power. It was enough for them in 1866; and why was it not enough now? If the Company had been in a position to say that the Corporation would not let them have the land in question, nor land anywhere else in Walker, there would be something in their present application; but that was not the case. In 1876, they took fresh leases in Willington; in 1884, they got a fresh lease of the land at Walker, and obtained an Act in the same year; and on none of these occasions was anything said about the necessity of the Company owning the freehold of their works. On the contrary, it was provided, oddly enough, in the Act of 1884 that the Company might, for the purpose of their undertaking, purchase, take, and hold, "by agreement, but not otherwise," in addition to the lands described in the schedule to the Act (the land referred to in the new leases), any lands and hereditaments, not exceeding in the whole 10 acres, which the Company might from time to time require. Thus there was a series of acquiescences in the leasehold arrangement.

The CHAIRMAN: They have never communicated with you as to purchase?

Mr. PEMBER: Not until a month ago.

The CHAIRMAN: After this Bill was deposited?

Mr. PEMBER: Yes; and after they had our petition. Continuing, Counsel maintained that there was absolutely no precedent whatever for the compulsory purchase, as was here proposed, of the interest of a reversioner with whom a contract had been made, who had done nothing to vitiate the contract, and whose conduct had been so absolutely blameless as that of the Newcastle Corporation. Sir George Livesey said it was quite a common thing to ask for such power. But the only instance, so far as he (Mr. Pember) knew, of such a proposal was that of Waterlow Park; and in that case it was refused. The Committee might want to know why Parliament gave compulsory powers in the case of a railway and not of a gas company. The presumption in the former case was that the railway could only be made on one line; and clearly unless Parliament gave compulsory powers there would be a series of gaps. In the case of gas-works, however, the presumption was that there was a choice of sites. As representing the Corporation of Newcastle, he was prepared to show one or two sites which he was quite ready to let the Company have if they wanted them. There were two in Walker itself. The Corporation being the owners of 1100 out of 1150 acres, there might be a dozen sites on which they would not object to see gas-works, and as many on which they would, because the ones to which they would not object would not interfere with the development of their property, whereas the others would or might. As to compulsory purchase where there was opposition, he knew of only one instance; and that was in the case of the South Metropolitan Gas Company last year. Where was the hardship of transferring the works to another site? They had still 33 years to run; and during that period, he would undertake to find a site. If he failed, the Company could go to Parliament saying they had tried to get another site, that the Corporation were the owners of all the land, and that they could not get it. In those circumstances, he thought the Counsel who had to appear for Newcastle would have an uphill task. In conclusion, he referred briefly to the minor points of the proposed railway, the enlargement of the works, and the perpetuation and enlargement of the gangway and jetty, to all of which he said Newcastle were strongly opposed.

Alderman *William Sutton*, the Chairman of the Estates and Property Committee of the Newcastle Corporation, said that since the Company took the leases, the land of the Corporation close to their works had been developing for residential purposes. The unanimous opinion of the Corporation was that the extension and permanent retention of the gas-works on the site at Walker would damage the prospects of the Corporation there for leasing purposes. The Company had not consulted them with reference to the proposed connection with the North Eastern Railway Company. As to the gangway at Willington Gut, it would be a very great hardship on the Corporation to make that permanent.

In cross-examination by Mr. FITZGERALD, witness said he supposed that the damage, if any, which would result from making the gangway permanent could be met by compensation. He admitted that houses had been built quite close to the gas-works subsequent to the construction of the works. As to turning the leasehold into a freehold, the Corporation objected to freehold interests being created on their property. They had sold portions of this estate in Walker for public purposes under compulsory powers—to the North Eastern Railway Company, the Newcastle Gas Company, and others. If the extension of the works led to the Corporation being unable to dispose of their land, they could obtain compensation on that basis; but they might have difficulty in establishing the fact to the satisfaction of an arbitrator. The Company were acquiring about four-and-a-half acres, and about another acre-and-a-half would be affected.

Mr. *William Sowerby*, Secretary of the Walker and Byker Building Society, said the proposal to bring the gas-works to one side of Bath Street, and to make a siding in front of the houses in Foster Street, would injure the adjacent property, and make it of less value.

Several other witnesses expressed opinions that the extension of the works would depreciate the property in the neighbourhood. One of them also stated that he had been instrumental in obtaining 130 signatures of persons living near the gas-works to a petition in opposition to the proposal to extend the works.

This concluded the evidence for the Newcastle Corporation.

Mr. FITZGERALD, in replying upon the case, said it was not challenged that the present demand for gas had so largely increased that it was necessary to extend the works very considerably. The Committee, therefore, had to decide whether it was reasonable that the Company should acquire the additional four acres of land and that they should be allowed to turn the leasehold tenure of the site of their existing works into a freehold. The gas-works were in their present position, not only with the consent of the Corporation, but under a positive covenant with them to erect gas-works there. This showed conclusively that it was considered to be a proper place for gas-works; and surely the natural thing to do, if the works required extension, as it was admitted they did, was to extend them on the piece of unoccupied land adjoining. It would be really difficult to find a more suitable site for extension, seeing that the surroundings were the rubbish-heap of the Walker Colliery Company, the waggon way of the same Company, and houses the greater number of which had been built since the gas-works came into existence—showing that the builders of them had no real and substantial objection to the vicinity of gas-works. If the works caused any nuisance, the Company could be proceeded against at once under the General Gas Acts. He denied Mr. Pember's assertion that the proposal to turn the leasehold into a freehold was utterly unprecedented. A precedent for a lessee obtaining compulsory powers to purchase the freehold interest was afforded by the Rathmines and Rathgar Improvement Act of 1885; the land there, as here, being required for a public purpose. Moreover, Mr. Shiress Will, in his recognized work on Gas and Water Supply, stated the means by which parliamentary authority to supply gas was obtained, and then said: "Parliamentary authority having been obtained, certain consequences follow. The company obtain power to construct their works, and, if need be, to take defined land compulsorily." That entirely coincided with what Sir George Livesey stated. In the South Metropolitan case of last year, the Company asked for 140 acres, and obtained compulsory powers over 120 acres. The manufacturer who had the other 20 acres, and who acquired the land for the purpose of a manufactory which required water frontage, was actually manufacturing at the time, and stated that he could not get a site elsewhere. In these circumstances, he thought it would have been very unreasonable if he had been turned out. But though he (Mr. Fitzgerald) represented in that case the dissentient landowner, he never thought of suggesting that there was anything unusual in asking for compulsory powers. The Company, to meet the demand upon it, would have to issue further capital, including loan capital. But they could only borrow money, if at all, at a much higher rate of interest if their works were on leasehold ground than

would be the case if they were on freehold land; and this additional expense would ultimately fall upon the consumer. Counsel then referred to the railway and the gangway and jetty, pointing out that the proposals of the Company in respect to them would result in considerable economy. In conclusion, he stated that the three Local Authorities of Wallsend, Willington, and Walker were perfectly satisfied with the amendments introduced into the Bill, which showed, he thought, that the Company had been desirous of acting in a reasonable manner and meeting fairly any objection which could be urged against the Bill on public grounds.

The CHAIRMAN inquired whether the recommendations of the Local Government Board in reference to the Bill had been complied with?

Mr. FITZGERALD said he understood they had been. As to the observation in the report of the Local Government Board, that there was no provision for a reduction of the rate of dividend when the price exceeded the standard, he said an alteration had been made so that the clause was in the ordinary form. In another paragraph, the Local Government Board drew attention to the fact that the discounts in the Bill were unusually large. Counsel informed the Committee that large discounts were by no means uncommon, and that the question of discounts varied with each locality.

The room was then cleared while the Committee deliberated in private. On the re-admission of the parties,

The CHAIRMAN said: The Committee decide that the preamble is proved; but before we go through clauses, Mr. Acworth, I think you had better give directions that this clause in the Local Government Board's report should be looked into: "Purchase of existing sites," and so on. "The provision usually made in such cases is to the effect that the sums shall be available only for repayment of outstanding loans." It affects you more than the promoters.

Mr. ACWORTH said he did not propose to take any further part in the proceedings in the House of Commons, and therefore there would be no object in his discussing that point.

The Committee then adjourned till the next day, when the clauses were adjusted (no alterations of importance being made); and the Bill, as amended, was ordered to be reported to the House.

COMMITTEE ON UNOPPOSED BILLS.

On Monday last week, the Deputy-Chairman of Committees (the Right Hon. Arthur F. Jeffreys) had before him the following Bills among a number of unopposed measures.

BURGESS HILL AND ST. JOHN'S COMMON GAS BILL.

Sir Chandos Leigh (the Speaker's Counsel) drew attention to reports on the Bill from the Home Office and the Local Government Board, and mentioned that objection was taken to a clause to allow of the provision of power gas. The clause in question was struck out. He also said that exception had been taken to the price of gas, which had been brought down from 6s. to 5s. 6d. per 1000 cubic feet. Mr. Jeffreys asked how it was that gas was so dear in the district; and the Parliamentary Agent said the place was small, and of a very scattered nature. Various clauses having been amended to meet the requirements of the Government Departments, the preamble was passed, and the Bill was subsequently reported to the House. The Committee in the course of their report said:

The Bill authorizes the Company to raise additional capital; but the usual provisions for the offer of such capital by public auction or tender were varied in the Bill as submitted to the Committee, so as to enable the Company to fix the reserved price put upon such capital at less than the nominal value thereof. A similar variation of the auction clauses is contained in the Shepton Mallet Gas Act, 1902; and the Committee, after hearing the promoters on the subject, considered that the proposed variation might be sanctioned. A report from the Local Government Board relative to clauses 6, 57, 58, 63, 65, and 68 of the Bill had been considered by the Committee. [The clauses referred to relate to the general purposes of the Company, the limits of price, discounts, pressure, and injury to meters.] With regard to clauses 6, 63, and 65 of the Bill as laid before the Committee, the promoters had amended the same so as to omit the proposals in regard to the supply of power gas. With regard to clause 57, the promoters had reduced the maximum price of gas to 5s. 6d.; and, after hearing their explanation, the Committee were satisfied that the reduced maximum price was a reasonable one, and had allowed it accordingly. With regard to clause 58, provision was made in the clause as submitted to, and passed by, the Committee, for notice being endorsed on demand notes of discounts or rebates in consideration of prompt payment being allowed by the Company, and for the increase of the rate of discount to 15 per cent. to apply in any case. Clause 68 had been struck out of the Bill. A report from the Secretary of State for the Home Department, relative to clauses 6, 65, and 68 of the Bill, had been considered by the Committee. The promoters had struck out the powers with reference to power gas, and had omitted clause 68 from the Bill.

MARKET DRAYTON GAS BILL.

In connection with this measure, it was stated that the standard price asked for was 5s.; the present ordinary selling price being 4s. 6d. Market Drayton was 25 miles from Wenlock, where the charge was 6s. Sir Chandos Leigh remarked that when Wenlock had 6s., he thought Market Drayton ought to have 5s. Mr. Jeffreys said he saw that the Directors' qualification was to be ten shares. That was a very small qualification. He wished to know the value of the shares. The Parliamentary Agent for the Bill replied that they were £10 each. The preamble was passed and some new clauses added; one being for the protection of the Great Western Railway.

IPSWICH GAS BILL.

Sir Chandos Leigh said he noticed that the promoters obtained £28,000 of capital in 1847, £50,000 in 1864, and £31,730 in 1883. It had been proposed to raise £150,000 now; but this sum was reduced to £120,000. The borrowing powers would be to the extent of one-third of this amount. Mr. Corbet Woodall (who was attending to support the preamble), in reply to Sir Chandos Leigh, said the gas supplied was of 15-candle power, and the present price was 2s. 8d. per 1000 cubic feet. The standard proposed was 3s. 9d., with no increase of dividend until the price was reduced to 3s. 6d. The preamble of the Bill was passed.

BROADSTAIRS GAS BILL.

Mr. Jeffreys inquired as to the price of gas; and the Parliamentary Agent stated that it was 3s. 3d. per 1000 cubic feet, and had been low for a good many years. The promoters did not propose a standard price. The preamble of the Bill was passed.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Thursday, April 2.

(*Before Mr. Justice* RIDLEY.)

Llandrindod Wells Water Company v. Hawksley and Others.

This was an action to recover a portion of the fees paid by the Company on taking up an award in an arbitration between them and the Llandrindod Urban District Council, on the ground that the amount was excessive.

Mr. C. A. RUSSELL, K.C., and Mr. HERBERT SMITH appeared for the plaintiffs; Mr. LYTTELTON, K.C., and Mr. BRUCE WILLIAMSON represented the defendants.

The facts were briefly as follows: In the year 1901, an Act of Parliament was passed authorizing the acquisition of the Company's undertaking by the Urban District Council. Not being able to agree on the price, Arbitrators were appointed—Mr. Hawksley by the Company, Mr. Mansergh by the Council; and these two gentlemen nominated Sir George Bruce as Umpire. The Arbitrators being unable to agree, the matter was referred to the Umpire, who went down to Llandrindod and viewed the works. On Feb. 3, 1902, he made his award, which amounted to £13,820. His Solicitors wrote to the plaintiffs saying the award was ready and would be given out on payment of his fees, which were £476 12s. The plaintiffs thereupon paid the fees and took up the award. The Council had to pay the costs of the proceedings; and plaintiffs' Solicitors accordingly sent in their bill of costs, including the fees paid to the Umpire, for taxation. The Council's advisers objected before the Taxing Master that the fees were excessive; and he thereupon asked for particulars of the charges. Some correspondence ensued, as the result of which Sir G. Bruce's Solicitors furnished the following items: The Umpire's fee, 195 guineas; the two Arbitrators, 120 guineas each; the Solicitors' charges for drawing up award, &c., £19 17s. Further particulars were refused, on the ground that much trouble and inconvenience would be occasioned in future to other members of the engineering profession if the request were complied with. On the matter again coming before the Taxing Master, in the absence of any evidence to support the charges, he took the course of allowing so much per day for the arbitration, which he put at 2½ days, as the proceedings continued on the second day to 5.30 p.m., an extra day for the consideration of documents, and three days for the Umpire's visit; the result being that he allowed £357 7s. The plaintiffs now sued to recover £119 5s., the difference between that sum and the £476 12s. they had paid on taking up the award.

Mr. RUSSELL submitted that the plaintiffs were entitled to succeed, because, if the defendants contended, as no doubt they would, that the fees charged were fair and reasonable, they ought to have furnished full particulars, and supported them before the Taxing Master, when they might have been allowed. He referred to one or two cases of a somewhat similar character, in support of his contention.

Mr. *Hawksley*, Mr. *Mansergh*, and Sir *G. Bruce* gave evidence as to the time they had devoted to the matter; and Sir *F. Bramwell*, Mr. *Corbet Woodall*, and other witnesses, supported the charges as being reasonable.

His LORDSHIP reserved judgment.

Guaranty Incandescent Mantle Company v. Hill.

In the Chancery Division of the High Court of Justice last Friday an application was made by Mr. Sebastian (instructed by Messrs. Cave and Co.) for an injunction to restrain the defendant, his servants, and agents until judgment in the above action, or further order, from selling or offering for sale incandescent mantles not of the plaintiffs' manufacture in cases or receptacles which, by reason of colourable imitation of the plaintiffs' cases, were calculated to represent or lead to the belief that the mantles contained therein were of the plaintiffs' make; also from using the plaintiffs' distinctive word "Dura" upon any cases, receptacles, or mantles, without clearly distinguishing them from the plaintiffs' goods; and from assisting others to pass off any such mantles as being of the plaintiffs' make. The order was made in terms of the motion.

The Gaslight and Coke Company Fined for Deficient Illuminating Power.

At the Marylebone Police Court last Friday, the Gaslight and Coke Company were summoned, before Mr. Curtis Bennett, by the London County Council for supplying gas of less illuminating power than that required by their Act of 1876, at the testing-station at 170, Camden Street, Camden Town. A representative of the Council stated that, on the 15th of November last, the gas was tested at the station, and the result showed an illuminating power of 15·50 candles, or half-a-candle less than the statutory power. As the Company disputed this, the Chief Gas Examiner for the Metropolis (Lord Rayleigh) was called in, and his report confirmed the finding of the Council's officer. His Worship ordered the Company to pay 40s., with 23s. costs.

MISCELLANEOUS NEWS.

BILLS AND ORDERS OF THE SESSION.

The Board of Trade report on the applications for Gas, Electric Lighting, &c., and Water Bills and Provisional Orders for the present session has been issued. It shows that the number of Bills relating to the supply of gas is 37 (exclusive of two classed among Electricity and Water Bills), all of which relate to England and Wales. The capital proposed to be raised is £3,939,148—£1,764,000 by shares and £2,175,148 by loans. There are 13 Bills relating to the supply of electricity for England and Wales, two for Scotland, and one for Ireland—exclusive of two classed among Tramway and Gas Bills. The amount of capital proposed is £6,955,000—£5,100,000 by shares and £1,855,000 by loans; but in seven cases the capital is not stated. There are 20 Bills relating to the supply of water, all (with the exception of an Irish Bill) being for England and Wales. The proposed capital is £1,856,735—£324,000 by shares and £1,532,735 by loans; the latter sum including £12,627 proposed to be authorized for water expenditure by a Bill classed among Gas Bills. Provisional Orders to the number of 23 have been applied for in respect of gas and water supply, and 61 in regard to electric lighting schemes. The capital proposed to be raised under these Orders is: Gas, £251,666; water, £202,083; gas and water, £214,800 (making together £668,549); and electric lighting, £642,226. Compared with last year, the capital required for gas purposes by Bills is £1,139,611 more, for water supply £2,833,830 less, and for electric lighting, &c., £3,021,001 more. For Gas and Water Orders, the capital proposed is £246,615 less, and for Electric Lighting Orders £953,369 less.

ALDERSHOT GAS AND WATER COMPANY.

Application for a Provisional Order.

An inquiry was held at the Board of Trade Offices, Whitehall, on the 25th ult., before the Hon. T. H. W. PELHAM, into an application by the Aldershot Gas and Water Company for a Provisional Order under the Gas and Water Works Facilities Act, 1870, to enable them to raise additional capital and to extend their works at Aldershot and Farnborough.

The various authorities concerned adopted different attitudes with regard to the application. On Feb. 26, the Aldershot District Council had an interview with the Company, when an agreement was come to that the amount of capital to be applied for should be reduced to £100,000 (with the usual borrowing powers), of which £40,000 was to be "earmarked" and expended on water; that all share and other capital should be sold by auction; that within four years a water-tower should be built to contain sufficient water for a day's supply; that the sections of Acts allowing the Company to supply water in bulk outside their district (except to the military) should be repealed—the Company not to supply without the consent in writing of the Council being first obtained; and that the Council should approve of new works being erected near the Company's tramway or siding in Aldershot parish. The Council, therefore, having obtained the concessions they desired, practically supported the Company. The Farnborough Council wrote stating that they wished to remain neutral. The Yorktown and Blackwater Company asked for a stipulation that the Aldershot Company should use none of the additional capital for the purpose of extending their mains in the district over which the Blackwater Company had rights. The Frimley and Farnborough Water Company and the Wey Valley Water Company objected to the stipulation which had been made with the Aldershot Council, that the sections of Acts allowing the Company to supply water in bulk outside their own district (except to the military) should be repealed, and that the Company should not supply water outside the district without the written consent of the Council. The two Companies requested that the proviso be added to this clause that the consent of the Aldershot Council should not be required in respect to the supply by the undertakers of the Frimley and Farnborough District Water Company and Wey Valley Water Company, of water in bulk of a total quantity not exceeding the quantity the Companies shall supply to the camps and barracks within their respective limits of supply. The Frimley District Council asked the the price of gas in their district should be reduced, and, furthermore, requested that the Company be made to put a testing-station in the district. There were two adjoining residents who objected to the extension of the North Camp Gas-Works.

Mr. BLYTH appeared in support of the application. The Aldershot District Council were represented by Mr. BONNOR-MAURICE; the Yorktown and Blackwater Company by Mr. CROWTHER; the Frimley and Farnborough Water Company and the Wey Valley Water Company by Mr. CRUNDWELL; the Frimley District Council, by Mr. MARSH.

Mr. BLYTH stated that in 1866 the Aldershot Gas and Water Company obtained an Act which authorized them to supply gas and water in the Aldershot parish. The North Camp and Farnborough Company obtained their powers in 1877; and this Company was acquired by the Aldershot Company under their Act of 1896. The present Order dealt with two matters only. At first the Company intended to apply for power to raise £120,000 of share capital, with one-third borrowing powers; but they had arranged terms with the Aldershot District Council, as a result of which they were now asking for power to raise share capital to the extent of only £100,000, with one-third borrowing powers. With regard to the proportion of loan capital, the practice of the Board in the past had been to give one-fourth only; but Parliament now gave one-third. As to the question of land, the Company at present had manufacturing powers only on the original lands granted to the Aldershot Company and the North Camp Company. This consisted of 4¾ acres at Ash Road, Aldershot, and about 1 acre in connection with the North Camp Company. In 1901, when the Company were before Parliament, they obtained storage powers over some land close to the works in Ash Road; and in 1896, they secured authority to construct a branch railway down to the South-Western line. In the land which had been taken for the purpose of building this siding, there were corners which had not been used; and in 1901 the Company obtained power to store gas on the surplus land along the line. They now wanted manufacturing powers over the land; and to this the consent of the Local Authority had been obtained, while not a single objection had been raised. At North Camp, they wanted an additional acre of land immediately adjoining their present works. They had power to store gas on this land also, because they had applied for it under section 5 of the Gas-Works Clauses Act, 1871. Notices of the application had been served upon the various owners and residents; and four objections only had been received. Of these, two had since been withdrawn; and the only people who now objected were Mr. Wheeler and Mr. Hall. The Company had not obtained the consent of the Farnborough District Council, who intimated that they wished to remain neutral. Under these circumstances, he hoped that their consent might be dispensed with. They had given no notice of any objections; so that the Company did not know what reasons they had for remaining neutral. With regard to the Aldershot District Council, there was now only one point raised. This was with regard to the arrangement that the Company should not supply water in bulk outside the district (except to the military) without the consent of the Council. At the present time, the Company had power to supply water in bulk to Companies and bodies outside their area; and in virtue of this power, agreements (terminable on six months' notice) had been entered into with the Frimley and Farnborough and Wey Valley Companies, who desired that the consent of the Aldershot District Council should not be required in respect to the supply to them of a quantity of water not exceeding the amount furnished by them to the camps and barracks in their respective districts. This, however, was a matter which concerned the two Companies named and the Aldershot District Council. Then the Frimley District Council considered that the price of gas in their area should be reduced. When the Aldershot Company went to Parliament in 1901, and acquired rights over these districts, a revision was made in the price of gas supplied to them. In the original area, the price was regulated by the Order of 1890; the rate fixed being 3s. 8d. per 1000 cubic feet, with a sliding-scale of 3s. for every penny rise or fall. Until 1901, the supply of gas to the district was regulated by the Order of the North Camp Company; the figure being 7s. In the Act of that year, however, it was stipulated that the price in the outlying districts should be not more than 1s., and not less than 6d., per 1000 cubic feet in excess of the tariff charged in Aldershot. As far as the promoters were concerned, they considered that this arrangement was protective to the outside and to the inside consumers; but the Frimley Council were now submitting that the price charged to persons in their district should not exceed 6d. above the amount charged in Aldershot. The Company thought the existing arrangement was fair to both parties, and that it was a matter to be settled between the Frimley and Aldershot Councils. The next point was the Frimley Council's request for a testing-station in their district. He would point out that already the gas was tested in three places—at the works in Ash Road, at the works at North Camp, and in the Aldershot Council's offices, where a testing-station had been fixed under the Act of 1901. The latter was a central point; and unless the Board were prepared to say that the Company should provide a testing-station in every authority's district, the Company were of opinion that the present arrangements were amply sufficient. Then as regards the Yorktown and Blackwater Gas Company, they had sole rights to supply in certain parts of their area; but over one part the Aldershot Company had concurrent rights with them. The Yorktown Company were the first to supply gas to the district; and at that time the North Camp Company were not in existence. The North Camp Company obtained their powers over the district in 1877; and from that year until 1890 the Yorktown Company remained a non-statutory concern, and the North Camp Company were therefore the only Company with rights to supply the district. In 1890, the Yorktown Company obtained a Provisional Order; but this did not in any way affect the powers which had been given to the North Camp Company in their Order of 1877. All it did was to give the Yorktown Company sole rights over a part, and concurrent rights over another part in conjunction with the North Camp Company. In 1896, the Aldershot Company acquired the North Camp Company; but not a word was said by the Yorktown Company to indicate that there was any question whatever as to the absolute rights which the North Camp Company held over the whole of their district. The scheduled agreement for the purchase of the North Camp Company recited that the Company should hand over the whole of their undertaking to the Aldershot Company. Not a word was said at the time of there being any question but that the North Camp Company had in this common district absolute and concurrent rights of supply. The Yorktown Company sat down, and allowed the Aldershot Company to purchase the North Camp district, without raising any question as to the title. It was not until the year 1899 that the matter first came up at all. The North Camp Company, owing to financial and other reasons, had not been extending their mains very rapidly towards the north part of their district. But when the Aldershot Company acquired the concern, they were in a position to push the matter more. They proceeded to extend the mains through the district; and then the Yorktown Company came forward with the suggestion that, by an arrangement in 1890, the North Camp Company had disenabled themselves in some way or other from supplying in the common district. The Aldershot Company, not knowing the details of the arrangement of 1890, set themselves to inquire whether there was any ground for the suggestion. As a result, the Aldershot Company came to terms with the Yorktown Company for acquiring the common property from them; but owing to the opposition raised by the Aldershot Council, the House of Lords refused to confirm the agreement, though the proposition had been authorized by the House of Commons. The Company's position now was that they had done

what they could in the matter. He submitted that the Aldershot Company were not excluded from supplying in the common district. He quite agreed that the decision of the Court of Referees was not binding on the Board; but he submitted that, when there was a distinct practice in Parliament, the Board should regulate their inquiries by that practice. And it was the distinct practice of Parliament to refer to the Court of Referees any point between competing companies, when it was only a question of capital. In 1877, there was a case settled which was identical almost in every point with the present one. It now remained for the Yorktown Company to state their case. The Aldershot Company contended that their powers had not in any way been restricted, but that they had absolute rights over the district in question. They were not at present supplying gas within the area; but the immediate result of the laying of their mains there had been to bring down the price charged by the Yorktown Company.

Mr. BONNOR-MAURICE said that Aldershot was a very populous district; and the Council felt that there was only sufficient water for the town and camp. Therefore they considered it was their duty to stop its being supplied in bulk outside the district, though they did not wish in any way to deprive the camp of water.

Mr. CRUNDELL said the Frimley Water Company had entered into a contract with the Government, by which they were pledged to supply 100,000 gallons daily if required. The Company did not want the water for their private consumers. The proviso asked for was such as to make the quantity taken from Aldershot limited to the amount the Frimley Company supplied to the Government.

Mr. MARSH, the Clerk to the Frimley Council, made application that the price of gas in the district should be reduced to a charge not exceeding 6d. per 1000 cubic feet more than the price in Aldershot.

Mr. PELHAM asked what change had taken place in the locality since 1901.

Mr. MARSH replied that there had been a great increase in the population. The Council felt that the present price was a hardship.

Mr. PELHAM again inquired what change had taken place in the last two years.

Mr. MARSH had to admit that, being only a period of two years, there had not been much change.

Mr. PELHAM said that he would have to show him that there was some extraordinary alteration in the circumstances before he could induce him to alter the Act of 1901.

Mr. MARSH remarked that, according to the Act of 1901, this arrangement would have to remain in force for seven years.

Mr. PELHAM remarked that that was only the more reason why Mr. Marsh would have to show some extraordinary cause for changing the law. Had Parliament thought there was any probability of sufficient change of circumstances to warrant any alteration in the scale, they would have made the law for three years instead of seven.

Mr. MARSH then gave up this point, and passed on to the question of the testing-station. He said that all the gas supplied in the district of the Frimley Council was manufactured at Aldershot; and in some cases this was 4½ miles away. The gas was tested at North Camp; but the Council felt that this was not satisfactory. They asked that a testing-station should be placed in their district.

Mr. PELHAM: Not an unnatural thing to ask for.

Mr. BLYTH said the Council were asking the Company to spend £250 on a testing-station for 236 consumers.

Mr. CORBET WOODALL (who is advising the Company) remarked that 90 per cent. of the gas-testing stations of companies were at the works. The Aldershot Company had not only a testing-station at their works, but one at the Council's offices. They also had a testing-station at Farnborough, which was a thoroughly efficient test. The Company furthermore, were not bound to keep up the standard quality of the gas for all parts of the district.

Mr. CROWTHER, on behalf of the Yorktown and Blackwater Gas Company, said that in 1859 the Company was formed by local people for local purposes. They at once commenced to supply gas to the districts of Yorktown, Camberley, and Frimley. In 1877, the North Camp Company obtained a Provisional Order over various districts which included Frimley; and in 1890, the North Camp Company applied for an Order to extend their gas-works, with a view to supplying Frimley with gas. The Yorktown Company opposed this; and ultimately an arrangement was come to between the two Companies whereby the Yorktown Company only were to continue to supply gas in this portion of the district. Mr. Hitchcock, one of the old Directors of the North Camp Company, and Mr. Baker, the late Secretary of the Company, were present at the meeting; and they were prepared to give evidence to the fact that they understood an arrangement had been made whereby the Yorktown Company should have sole rights over this particular district. The Secretary could prove going round with the Directors of the Companies to peg the boundaries; and he remembered that, when going along the road from Farnborough to Frimley, it had been observed that on the left-hand side the district belonged to the Yorktown Company, and on the right-hand side to the North Camp Company. This was clearly understood when negotiations were being made as to the sale of the North Camp Company; and no value was put upon the district over which they had agreed to give up their rights. In 1896, the Aldershot Gas Company bought up the North Camp Company; and this was followed by the agreement of 1900, whereby the Aldershot Company were to acquire the Yorktown Company, but which agreement was thrown out by the House of Lords. The Yorktown Company had been doing their duty, and had supplied the whole of their district with gas. Last year they spent £4000 on works and mains; and the consumption was 21½ millions—an increase of 13 per cent. over the previous year. The works were able to produce 50 million cubic feet per annum, and were therefore in a position to adequately supply the whole of the area with gas. Twenty-six years had elapsed since the North Camp Company obtained their powers; and yet in the district in question not a single house was supplied by any company but the Yorktown Company. He asked the Board to prevent the Aldershot Company from using any capital for the purpose of competing with the Yorktown Company. The Yorktown Company did not wish to oppose the Aldershot Company's application; but they felt that, as they had supplied the area for 44 years, it was not an unreasonable condition that the Aldershot Company should be disenabled from competing with them. He submitted a proviso to the effect that the Aldershot Company should not use any of the capital authorized by this Order in competing with the Yorktown Company in the Yorktown Company's area. He added that the Board of Trade had power to make this provision.

Mr. BLYTH: We object absolutely. It is entirely an unprecedented thing.

Mr. MARSH observed that, as far as the Frimley Council were concerned, they would prefer to have one Company only in their district. They would not like to have two Companies pulling up the streets. The Yorktown Company lit 185 street-lamps for the Frimley Council; and they had always given satisfaction. The illuminating power was not by any means less than that of Aldershot; but he would not go any further than that.

Mr. PELHAM thought that the simplest way out of the difficulty would be for the Aldershot Company to purchase the Yorktown Company.

Mr. BLYTH said that was just what the Aldershot Company wanted to do; but the Aldershot Council would not allow it.

The two individual objectors to the extension of the North Camp works—Mr. Hall and Mr. Wheeler—having complained of the smell which was caused by the manufacture of gas,

Mr. CORBET WOODALL remarked that there was bound to be some smell from gas-works; and if there was any way to increase the extent of that smell, it was by limiting the space upon which to carry on the manufacturing.

Mr. PELHAM told the two objectors that they could not prevent the Company from manufacturing gas on this site, as Parliament had granted them the powers; and he did not think that the smell would be increased by giving them more room to work upon.

This concluded the inquiry; and the award will be notified in due course.

WET v. DRY GAS-METERS AT BELFAST.

The Gas and Electric Committee of the Belfast Corporation have resolved that in future consumers should have the option of having dry meters without payment of a deposit, but that such option shall only be exercisable on changes of existing meters being found necessary by the department or in the case of first supply of a meter to a new house. The original arrangement when meter-rents were abolished was that the Corporation should issue to any consumer a wet meter free of charge; but if the consumer preferred a dry meter, he could have one on condition that he paid 50 per cent. of the cost, which was to be refunded on the return of the meter. The deposits which have been made under this regulation will now, of course, be handed back to the consumers. Mr. Andrews, in moving the adoption of the Committee's minutes at the meeting of the Council last Wednesday, said he had asked the Committee to give him permission to state, if necessary, his own private views why it would not be good policy to entertain the resolution regarding the supply of dry meters. The change contemplated would entail an enormous expenditure. Mr. Dempsey pointed out that a dry meter cost only two-thirds of what a wet one did. Alderman Sir James Henderson remarked that, though he was a member of the Committee, he believed he was justified in moving an amendment—seeing that he was not present when the discussion took place—that the paragraph relating to meters be deleted. His reason for doing so was that certain facts had come to light since the resolution was adopted. He might further add that there were a very small number of members present, and but four voted for the motion, and two against it. He was inclined to think that if the full Committee had been in attendance the resolution would not have been carried. While some people might like dry meters, he was of opinion that they were not so reliable as wet meters; and it had been undoubtedly proved that in the matter of repairs wet meters were very much superior to dry. During the year ending December, 1902, the meters tested numbered 8196, of which 846 were found to be inaccurate. These were divided as follows: Wet meters, 6572 tested; 365 rejected, or 5·5 per cent. of the total number. Dry meters, 1624 tested; 481 rejected, or 29·6 per cent. This showed at once that the wet meter was more reliable, and that it was the one the Corporation should have in use. Therefore he moved that the resolution be omitted. Alderman John M'Cormick having seconded the amendment, Mr. Dempsey urged that it was inconsistent to make any charge for dry meters when they supplied wet meters free. It gave the public the idea that wet meters were supplied because the gas undertaking made something out of them. The meters, he thought, should be manufactured by their own staff, who could turn them out at half the price at present paid. The amendment was put, and lost by 17 votes to 12—one member not voting. Mr. M'Clure suggested that a special meeting of the Council in committee should be held to consider the whole matter. The Lord Mayor said that if the Gas Committee requested him to convene such a meeting he would be happy to do so. Mr. Andrews did not think the Council in committee could settle the matter any better than the Gas Committee. He was sorry that the members had voted as they did on Alderman Henderson's amendment, as it committed the Council to an expenditure of probably £30,000 on capital account. He was inclined to believe that the Council probably voted in ignorance of the subject they were dealing with. Alderman Anderson said the matter was an extremely important one, and should be discussed by the whole Council in committee, to which Mr. Andrews replied that he had no objection to such a meeting being called. The minutes were then adopted.

The Directors of the River Plate Gas Company, Limited, recommend a final dividend for the year ended Dec. 31 of 8s. per share, tax free (making altogether 7 per cent. for the year), carrying forward £15,643.

PUBLIC LIGHTING OF GRANTHAM.

Triumph of Incandescent Gas over Electricity.

At the Meeting of the Grantham Town Council last Wednesday, the Markets and Fairs and Lighting Committee reported upon the steps they had taken in connection with the public lighting of the borough. They stated that tenders had been received from the Grantham Gas Company and the Urban Electric Supply Company. The specifications issued by the Committee required tenders to be sent in for lighting for one, three, and five years. The Gas Company submitted prices for each of these periods; but the Electric Supply Company's tender was one for five years as regarded the whole of the lighting. For one year and three years, prices were given for a portion only of the lamps. The Electric Company pointed out that the acceptance of their tender would necessitate a large outlay, and that they should not care to incur this expenditure for a contract for less than five years. Both the Companies suggested lighting schemes as alternatives to the one provided for by the Committee's specifications. These were fully discussed; but the Committee decided to abide by the scheme they had prepared, which provided for 20 lamps of not less than 750-candle power, 3 lamps of not less than 160-candle power, 14 lamps of not less than 50-candle power, and 350 lamps of not less than 25-candle power (incandescent). The Gas Company's tender for this lighting for a period of three years, at a minimum number of 2800 hours a year, amounted to £1258 10s per annum. The Council were recommended to accept this tender for a period of three years from the 1st of August next, subject, however, to the Company sending in a plan showing the positions in which they proposed to place the lamps (which positions were to be approved by the Council), and subject also to their entering into an agreement for the due performance of the works included in the tender in accordance with the Committee's specifications. These required that the lamps should be lighted, and kept lighted, under penalties ranging from ½d. to 4d. per lamp (according to the size of the lamp) for each hour each lamp was not alight during the lighting hours; and also that the Council should have power to test the quality of the gas, and impose a penalty if it was found below the standard contracted to be supplied. The average cost of street lighting for the past three years had been £1328. The attention of the Council was called to the fact that the Gas Company's tender recommended for acceptance was somewhat less than the old contract; and at the same time the light to be supplied was considerably increased. The Company would in future be obliged to keep the lamps lighted—a duty which the present contract did not impose upon them. The adoption of the report having been moved and seconded, the Town Clerk stated that he had just received a letter on the lighting question from the Electric Supply Company; but it was decided not to take any notice of it, as it was not in the report. After a long discussion, a question was asked as to whether it was intended to submit to the Council the plan of the lamps before it was adopted. Mr. Land said he did not think there would be any objection, if the Council wished it; but he thought they would find in the report that the matter was very fully set out. The minimum number of hours was 2800; but they did not bind themselves to only 20 large lamps—they could have 18, or 22, or more than that, if they pleased. They had simply to pay £16 per lamp per annum. The candle power was given as 750; but this was the lowest limit, and the Company would be bound by it. But in the greater number of cases, if they were to have the illuminating power tested, they would find it was nearer 800 or 900 candles. The smaller lamps, put at 50-candle power, would come out at least at 70; and the remainder, described as of 25-candle power, would be something like 30-candle. The report was agreed to without opposition.

DORKING AND THE ELECTRIC LIGHT.

Gas Company to Apply for an Injunction.

A step, the result of which will be awaited with interest, is to be taken by the Dorking Gas Company with regard to the sanction recently obtained by the Urban District Council to borrow £20,000 for the purposes of electric lighting. At the half-yearly meeting of the Company last Friday week, the Chairman (Mr. W. T. Butler) reminded the shareholders that some time ago a public inquiry took place in the town by an Inspector of the Local Government Board with respect to this matter; but the notice given of the intention to hold the inquiry was so short that it was impossible for the Company to obtain the assistance of Counsel, though the Secretary (Mr. W. J. Down) attended and stated their case. Since these proceedings, the Board have authorized the loan asked for; and the Company, as large ratepayers, consequently feel that they have a right to be heard on the question. The Chairman made it clear that the Directors do not oppose the electric light as such, because they recognize that it is probably coming; but they object to the manner in which the Council are proceeding. He pointed out that the Council will in all probability be able to borrow the money at 3¼ per cent., and lend it to a company; and if the concern does not pay, the rates will sooner or later have to bear the burden. Such steps as the Council are taking, the Directors regard as being quite contrary to the meaning of the Public Health Acts; and they have therefore instructed Counsel to apply for an injunction to restrain the Council from carrying into effect a contract they have entered into with Edmundsons, Limited. It is stated that the application will be based on the contention that the Council have not complied with the provisions of the Public Health Acts, especially in regard to advertising for tenders, and on other technical points. The matter is not expected to come before the High Court until after Easter. Even should the application for the injunction fail, the prospects of electricity in Dorking do not appear of a very favourable character; for even the Chairman of the Council, who has just been seeking re-election, stated in his address to the electors that he was not in favour of lighting the streets with electricity, as he thought the Gas Company had fairly met the Council in this matter, and that the streets were now better lighted than those of any town of similar description to Dorking where the electric light is being used for the purpose. Such testimony as this—more especially coming, as it does, from a partisan of electricity—must be peculiarly gratifying to the Gas Company in view of the present dispute, though it is no more than is deserved by the excellent installation of Kern burners and "Dorking" lamps fitted up by them in the town and district.

SOUTHPORT CORPORATION GAS SUPPLY.

Mr. Corbet Woodall's Report on the Enrichment Experiments.

The report of the experiments conducted by Mr. Corbet Woodall in connection with the enrichment of gas at Southport has been published. He commenced his observations with notes dated Jan. 20, 1902, upon the cost of enrichment (*a*) with cannel, (*b*) with benzol, (*c*) with oil gas, and (*d*) with carburetted water gas. On July 3, 1902, Mr. Woodall's firm reported that a question had been submitted to them as to how best, having regard to efficiency and economy, ordinary coal gas, as made at Southport, could be enriched to the standard illuminating value of 16 candles. Comparing the deduced illuminating value of the coal gas with the average of the observations made upon the photometer, there was a difference against it of rather more than a candle. The following is a summary of the conclusions arrived at: The cost of enriching by the various materials was:—

	Per Candle.		Corrected Figures.
Cannel	1·250d.	..	1·250d.
Oil gas	0·691	..	0·691
Carburetted water gas	0·169	..	0·222

There was, in their opinion, no room for hesitation in deciding that, for the purposes of Southport, carburetted water gas furnished by far the cheapest means of bringing up the quality of coal gas to the standard required. In several of the trials of the coal, the illuminating power of the gas was found to average as high as 14½ and 15 candles. At present, while the carburetted water gas cost more per 1000 cubic feet than coal gas, it was much cheaper when the comparison was made upon the basis of candle power. They recommended the reconstruction of the retort-houses and settings. On Sept. 22, 1902, Mr. Woodall stated that the cost of enrichment by cannel, after allowing for the increased bulk of the gas, appeared to have been 1¼d. per candle per 1000 cubic feet. As to the Committee's opinion that 37 per cent. of carburetted water gas was excessive, he considered that 50 per cent. would give better results than 37 per cent. Coal gas of 12·66-candle power cost 10·96d. per 1000 cubic feet; whereas the same quality of carburetted water gas could be made for about 9d.

Taking the four methods in use at Southport, it was found that benzol did not appreciably increase the bulk of the gas in the course of enrichment. With oil gas, the enriching gas did, to some extent, augment the bulk. In the tests with oil gas, it was found that nearly 7 per cent. of the enriched gas was due to the addition of the enricher. In other words, assuming that a million cubic feet of enriched gas were sent out, about 930,000 cubic feet were due to the coal gas, and 70,000 cubic feet to the oil gas. With cannel and carburetted water gas, the action of these enrichers was very considerably to reduce the original quantity of coal gas needed; the balance being made up by the enricher. While cannel gave practically a fixed quantity of gas of a definite candle power, carburetted water gas could be, and was, made of any needed illuminating value within recognized limits; and as the cost of this gas was very largely made up of the oil required to give it the necessary illuminating power, it was economical to make a large bulk of it, of moderate candle power, rather than a smaller bulk of richer gas. In a supplementary report, dated Oct. 2, 1902, Mr. Woodall stated that, with regard to the purification of carburetted water gas, his experience with lime and oxide of iron was this: With lime, at 13s. per ton, the cost of purification would be about 1d. per 1000 cubic feet; or (say) five times the cost of oxide of iron purification based upon the materials and labour employed. In an interview with the Gas Committee on the 10th of February last, Mr. Woodall stated that at least 97 per cent. of the whole of the retorts in the gas works of Great Britain were of clay; and he suggested the rebuilding of the present retort-beds on a modern principle with clay retorts, on the erection of a new retort-house.

With regard to the complaints in Southport, Mr. Woodall reported that they were due to irregularity; and he said that if the Corporation would treat the water-gas plant fairly, and fix upon a settled gas, which, in the end, he stated, should be one-third water gas and two-thirds coal gas, the complaints would disappear. He recommended the Committee to instal two additional units of water-gas plant. What the Corporation ought to aim at was to give at least 16-10ths pressure at the burner in every part of their district.

Consequent upon the recommendation above referred to, clay retorts are to be substituted for those of brick; a new retort-house will be constructed; a uniform quality of gas, consisting of two-thirds coal and one-third carburetted water gas, will be supplied; while two additional units of water-gas plant will be installed in the present house, so as to permit of the use of three units, with one unit as a stand-by.

Brisbane Gas Company.—The accounts of this Company for the six months ending the 31st of December last show a net amount standing to the credit of the profit and loss account of £11,861, inclusive of the balance brought forward. The Directors recommended a dividend of 5 per cent., amounting to £6995, and a bonus of 9d. per share, £1049; making, with the dividend tax of £402, a total of £8446, and leaving £3415 to be carried forward.

INDUSTRIAL PARTNERSHIP AND THE PREVENTION OF DISTRESS.

Paper by Sir George Livesey.

At a Meeting of the Charity Organization Society, on Monday last week, the following paper was read by Sir GEORGE LIVESEY:—

At the two days' conference on the unemployed in the City a few weeks ago, one of the speakers said he had no faith in the nostrums proposed, but that the remedy was to be found in employers paying higher wages when trade was good, which would enable the recipients to put by something to meet periods of depression. This must have been a random expression, for surely that speaker knows that the last thing that occurs to ordinary workmen, as a rule, is to provide for the future in this way. They are not gifted with the foresight and prudence of a Joseph; for if they were, the difficulty under discussion would largely disappear.

The subject is wide and far-reaching. To attempt to deal with it at all thoroughly would require a treatise rather than a short paper, and a far abler pen and greater knowledge and experience than I possess. Sympathy with working people in their difficulties and anxieties, and a desire to help them to improve their position in life, even to a small extent, is my only claim to a hearing. "The poor ye have always with you;" but we are considering those who might be removed from the ranks of poverty, and thus prevent so much distress that the remainder could be dealt with easily.

The subject (or, rather, the title given by Mr. Loch), "Industrial Partnership and the Prevention of Distress," associates ideas whose connection is scarcely apparent. How industrial partnership is to prevent distress is a difficult question to answer. What is industrial partnership? It is much more than simple profit-sharing, which is but the first step in that direction. Industrial partnership, as I understand it, in its complete and ultimate form is a real partnership, beyond mere salaries and wages, of capital and labour, of employer and employed, in the business in which both are engaged—a partnership in capital, and therefore in the profits on capital, in responsibility, and in actual management. When this becomes general, the whole class of workmen will have been lifted to a higher plane. They will be owners of property, and thus removed from the risk of distress due to temporary depressions of trade.

But this is a dream, and any man who thinks it may come true will be regarded as a dreamer. The first step is to dissipate that pessimistic opinion. When the Gas Workers' Union was master in the retort-houses of the South Metropolitan Gas Company in the autumn of 1889, I had a daydream that possibly at some future time we might be again free. Within three months that dream was realized. But it never occurred to me as possible that in a dozen years or so nearly every man would be a shareholder in the Company; that some 4000 men would possess, in the ordinary stock or on deposit with the Company, £170,000, or upwards of £40 per man on the average; that numbers of working men who say that they could never previously save a penny are possessors of £100 or more (a good few having become owners of their houses); that three employees—two workmen and one clerk, elected by their shareholding comrades—would be sitting on the Board and taking part as Directors with credit to themselves and with advantage to the Company; that since 1889 a dispute or a difficulty or a difference of any kind between the workmen and the Company has been unknown; and that such a spirit of co-operative goodwill should prevail on the part of the men generally as to entirely relieve all who have to do with them from every trace of anxiety.

This is not an isolated case, for precisely similar results have followed the nine years' working of the system by the Crystal Palace District Gas Company; while there is good promise of the same at the Commercial Gas Company, where the system has been recently introduced. The same principle has also been adopted at the gas-works of Chester and of Newport, South Wales.

It is said that the circumstances of gas companies are exceptional; that a system suitable to them is unsuitable in other companies and industries; and that this is the reason why it has not been adopted. The answer is that gas companies are just as backward as other undertakings, and with less excuse, in not following the example set them and constantly brought to their notice during the last thirteen years. The real reason is want of conviction as to the necessity and advantage of doing something of the kind, or want of will.

Mention must be made of the extremely interesting and valuable work of the Labour Co-partnership Association, "whose object," using their own words, "is to bring about an organization of industry based on the principle of labour co-partnership—that is to say, a system in which all those engaged shall share in the profit, capital, control, and responsibility." They add: "This system is no mere dream. Independent of the co-partnership steps taken by ordinary businesses, the principle is carried out by British productive businesses, organized by working men, which at the end of 1901 numbered 100, had a capital of £1,480,833, sold in the year £2,947,061 worth of goods, made a profit of £161,694 (after deducting losses), and paid to labour, in addition to provident funds, a sum not easily ascertained, but exceeding £20,500 as labour's share of the results over and above standard wages."

Neither would it be right to pass over the great pioneer work of Mr. George Thomson, of the firm of William Thomson and Sons, Limited, of the Woodhouse Mills, Huddersfield, cloth manufacturers. Some seventeen years ago, he converted the business into a co-partnership concern, his workmen becoming shareholders, and having a share by elected directors in the management, with very satisfactory results, especially in the true spirit of co-partnership manifested by the workers.

The above particulars are given to show that the co-partnership of capital and labour is no "mere dream," but a practical solution of a very difficult problem—viz. the reconciliation of those two apparently diverse, but really identical, interests. If and when this becomes

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 19.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7 8
00,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
200,000	5	Nov. 13	6½	Bombay, Ltd. . . .	5¾—6¼	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4¾	..	5 9 5
380,000	Stk.	Feb. 26	12	Brentford Consolidated	240—245	−2	4 18 0
286,700	,,	,,	9	Do. New . . .	177—182	..	4 18 11
50,000	,,	,,	5	Do. 5 p.c. Pref. .	131—136	..	3 13 6
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	110—113	..	3 10 10
220,000	Stk.	Mar. 12	10½	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	,,	,,	7½	Do. A. Ord. Stk. .	151—155	..	5 0 0
460,000	20	Mar. 31	10	British.	38½—39½*	..	5 1 3
100,000	Stk.	Mar. 12	6	Bromley, 5 p.c. "A"	118—123	..	4 17 7
165,500	,,	,,	4½	Do. 3½ p.c. "B".	90—95	..	4 14 9
500,000	10	Oct 15	7	Buenos Ayres (New) Ltd.	10½—11	..	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	+1	4 4 3
150,000	20	Mar. 12	8½	Cagliari, Ltd. . . .	23—25	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
1,375,000	Stk.	Feb. 26	5	Commercial 4 p.c. Stk.	105—108	..	4 12 7
503,750	,,	,,	4¾	Do. 3½ p.c. ,,	99—102	..	4 13 2
407,817	,,	—	3	Do. 3 p.c. Deb. ,,	89—92	..	3 5 1
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	115—125	..	6 8 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
575,000	Stk.	Feb. 26	5⅛	Crystal Palace Ord. 5 p.c.	115—120	..	4 8 10
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120—125	..	4 0 0
106,158	,,	Jan. 15	5	Do 5 p.c. Deb. Stk.	137—140	..	3 11 5
486,090	10	Jan. 29	10½	European, Ltd. . . .	18—19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Feb. 12	4 4/10	Gas- 4 p.c. Ord. . .	80—82	..	5 7 4
2,600,000	,,	,,	3½	light 3½ p.c. max. .	85—87	−1	4 0 6
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	100—105	−2	3 16 2
4,193,975	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	89—91	..	3 5 11
2,2,500	Stk	Mar. 12	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct 30	8	Hongkong & China, Ltd.	15—16	..	5 0 0
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	204—207	..	4 16 7
473,600	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	100—103	..	3 8 0
165,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
561,000	Stk.	Feb. 26	10	Liverpool United A	219—221	..	4 10 6
718,100	,,	,,	7	Do. do. B .	161¼—163½	..	4 5 8
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.	113—115	..	3 9 7
75,000	5	Dec. 11	5	Malta & Medn., Ltd. .	4⅛—5	..	5 0 0
560,000	100	April 1	5	Met. of 5 p.c. Deb.	103—107*	..	4 13 6
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103*	..	4 7 5
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9½—10½	..	6 13 4
1,515,892	Stk.	Feb. 20	4½	Newc'tle & G'tesh d Con.	103⅛—104½	..	4 6 2
376,855	Stk.	Jan. 2	3½	Do. 3½ p.c. Deb.	97—98	..	3 11 5
300,000	Stk.	Nov. 27	8	Oriental, Ltd. . . .	143—148	..	5 8 1
600,000	5	Mar. 31	7	Ottoman, Ltd. . . .	6—7*	+¼	5 0 0
					* Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6⅝	Ply'mth & St'house 5 p.c	127—132	..	4 12 9
851,070	10	Oct. 15	7	River Plate Ord. . .	10¾—11¼	..	6 4 5
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	93—95	..	4 4 3
250,000	10	Sept. 26	8	San Paulo, Ltd.. . .	12—13	..	6 3 1
135,000	Stk.	Mar. 12	10	Sheffield A	234—236	..	4 4 9
209,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
103,235	Stk.	Mar. 31	5	Shrewsbury Ord. 5 p.c.	111—114*	..	4 7 9
6,000,000	Stk.	Feb. 12	5⅓	South Met., 4 p.c. Ord.	117—120	..	4 8 10
1,780,000	,,	Jan. 15	3	Do. 3 p.c. Deb. . .	91—93	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	105—110	+2½	4 0 11
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Feb. 26	6	Tottenham and Edmonton A. 5 p.c. B. 3½ p.c.	117—122	+2	4 11 4
300,520	,,	,,	4⅓		93—96	..	4 13 9
182,380	10	Dec. 30	8	Tuscan, Ltd.. . . .	8½—9½	..	8 8 6
149,000	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94—96	..	5 4 2
730,872	Stk.	Mar. 12	5	West Ham, 5 p.c. Ord.	95—100	..	5 0 0
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11⅓	Chelsea, Ord. . .	310—320	−5	3 11 11
150,000	,,	,,	5	Do. 5 p.c. Pref. .	145—150	−5	3 6 8
160,000	,,	,,	4⅓	Do. 4⅓ p.c. Pref. '75	130—140	−5½	3 4 4
175,785	,,	Mar. 31	4⅓	Do. 4⅓ p.c. Deb. .	137—142*	−1	3 3 5
1,720,560	Stk.	Mar. 31	8	East London, Ord.. .	227—232*	+1	3 9 0
654,740	,,	Dec. 11	4⅓	Do. 4⅓ p.c. Deb. .	142—147	..	3 1 3
1,282,913	,,	,,	3	Do. 3 p.c. Deb. .	96—98	−1	3 1 3
700,000	50	Dec. 11	8	Grand 10 p.c. max..	117—122	..	3 5 7
310,000	Stk.	Mar. 31	4	Junction 4 p.c. Deb..	123—128*	..	3 2 6
708,000	Stk.	Feb. 26	10⅓	Kent	29—300	..	3 10 0
160,000	,,	,,	7	Do. New, 7 p.c. max..	195—205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max..	300—3.0	..	3 11 0
406,200	100	,,	8⅓	Do. 7⅓ p.c. max..	220—230	..	3 13 11
350,000	Stk.	Mar. 31	4	Do. 4 p.c. Deb..	122—127*	−1	3 3 0
500,000	100	Feb. 12	12 6/10	New River, New Shares	390—400	..	3 4 0
1,000,000	Stk.	Jan. 29	4	Do. 4 p.c. Deb..	123—128	−2	3 2 6
902,300	Stk.	Dec. 11	7	South-wark and Ord. . . .	202—207	..	3 7 8
126 500	100	,,	7	7⅓ p.c. max.	190—200	..	3 10 0
489,200	Stk.	,,	5	5 p.c. Pref.	151—154	..	3 4 11
1,019,585	,,	Mar. 31	4	Vauxhall 4 p.c. A Deb.	122—127*	+1	3 3 0
1,155,066	St	Dec. 11	10	West Middlesex. . .	290—300	..	3 6 8
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general, the question of the prevention of remediable distress will have been solved; and Mr. Loch is therefore right in the title of the subject chosen for this afternoon's consideration.

The great weakness of this country is that our large working population—speaking, of course, generally—have no share in its vast accumulated property. They are not property owners. The great strength of France is that the bulk of the population are property owners. Hence the proverbial thriftiness of the French and the thriftlessness of the English. My limited experience tends to show that the striking contrast between the French and English on this point is due to their different circumstances—the French being property owners and the English not. It is this fact that has developed the thrifty spirit in the one and caused its absence in the other.

I have a dream that this difficulty will be removed, and that the Twentieth Century will do for the English working or wage-earning class what the Nineteenth Century did for the middle class. By the aid of the joint stock limited liability system—the growth of the last century—the great and wealthy middle class of this country has attained its present position. That system has not only given this section of the people the opportunity of investing their savings, but it has at the same time so enormously increased their capacity for saving that the result is what we see to-day. Unfortunately—most unfortunately—the working class has no part or lot in this great inheritance; and it is my hope and expectation that this grave defect will be removed ere the present century closes. If not, then woe be to Old England.

The wonder is that our wage-earners, having no stake in the country, are so patriotic. But they are certainly not contented with their lot; and this discontent will grow until it becomes a real danger to the State, unless those who have the power and influence to remedy it—viz., the great class of employers—take the matter earnestly and seriously in hand. The trend of the working classes seems to be strongly towards Socialism—the state is to provide and do everything for them—which means ruin all round; but make them property owners, and all this is changed. They will certainly become thrifty; and then, having a real interest in the country, they will take their part in its government with credit to themselves and to its general advantage. In fact, I see no other way of combating Socialism; and this will be effective. Given the opportunity and such encouragement as is possible, our working men are not so thriftless as is commonly supposed. Their thriftlessness is due to the fact that they regard as hopeless any attempt to accumulate, and therefore do not try. When the South Metropolitan Gas Company started their profit-sharing system, they gave the men the option of leaving their annual bonus in the Company's hands at interest; and, to the surprise and pleasure of all, no less than 45 per cent. did save it. This percentage has gradually increased until at the distribution last year it had risen to well over 80 per cent. saved. This is the strength of the system. Had the annual bonuses been regularly withdrawn, no permanent good would have resulted to the workmen, and the profit-sharing system would have been a failure, and would certainly have been abandoned long ago.

If industrial partnership is to be so great an agent in our industrial life, and incidentally in the prevention of distress, how is it to be made general, and what are the difficulties in the way of its adoption and success? The first and chief difficulty is that employers generally do not see its importance, and are not, therefore, disposed to take it up, and to give the necessary time and attention to secure success; for it certainly will not work itself. It must be worked as earnestly and intelligently as any other branch of their business. If employers could be enlightened on the subject, the joint-stock system, by which all great industries are now worked, is just the thing. It is a partnership, and all that is necessary is to include the wage-earners. This can be done, as recommended by the Labour Co-partnership Association, by paying the profit-sharing bonus partly or entirely in shares in the concern. This is done by the gas companies above referred to, who pay half in the ordinary stock of the company, bought at the market price of the day, while the other half is payable in cash. The greater part of the men, however, as already stated, either leave it on deposit at interest or invest it in stock.

Another difficulty to the introduction of the system is the dislike of the Trade Unions. At this there need be no surprise, for the ultimate success of co-partnership means that employers and employed will be one, and therefore there will be no need for the Trade Union as it now exists. It will, in fact, be superseded by a superior system. There are already some Trade Union leaders in the North of England who have the courage to say that if a better system, such as co-partnership, supersedes their organizations, they will welcome it. At present, such men are few in number, and official Trade Unionism generally is either quietly opposed or actually hostile to all systems of profit-sharing that tend in the direction of partnership. Partnership in businesses such as railway and other companies, where employment is regular and constant, is, I believe, quite possible and practicable. But where employment is casual and uncertain, the co-partnership system is at present scarcely applicable; and, unfortunately, from these fluctuating businesses mainly comes the distress caused by want of employment.

Of course, there are many and great difficulties; but there is also great danger to the industrial community and to the State. Something must be done, and it appears clear that it must be in the direction of co-partnership, which I thoroughly believe is the goal of British industry. Employers are doubtless in many cases fearful of the result of bringing their workmen into partnership, which need cause no surprise. But, so far as my experience goes, working men respond most satisfactorily to the trust their employer reposes in them. Confidence begets confidence; and mutual confidence between employer and employed is the foundation of any and all good relations. If and when the working classes become possessors of property, one indirect effect in the prevention of distress will be that employment will be more regular and constant, for they will be not mere labourers, but, by virtue of their thrift and savings, acting promoters of productive industry.

Is my ideal right or wrong? If right, then the co-partnership of

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capital and labour is worth any effort to make it general as speedily as possible, for among other great advantages that it will bring may be numbered the prevention of distress. Or the ideal may be right, but the method for its attainment not the best. All that can be said in its favour is that so far it has succeeded beyond expectations. If, however, a better can be found, by all means let it be tried. If my ideal is wrong, the sooner it is exposed the better. The great advantage of meetings such as this is that they tend to discover truth and expose error. For that reason I thank Mr. Loch and the Charity Organization Society for this opportunity of discussing a very important question.

In the course of the discussion which followed the reading of the paper, Mr. T. C. Taylor, M.P. for Radcliffe, explained the profit-sharing system in operation in his firm, and expressed the opinion that the thing paid even from a pecuniary point of view. Mr. H. Hutchinson, who had adopted the system in connection with a small builder's business in the country, claimed that it prevented strikes, but said it was not properly organized. The individual worker should be protected by law, just as the shareholder was under the Limited Liability Acts. Mr. H. Vivian, Secretary of the Labour Co-partnership Association, complained that Trade Unionists had been unfairly dealt with by the author of the paper, and maintained that they were not so much against the profit-sharing system as was supposed. Sir George Livesey said he should be glad to hear that they were not. Continuing, Mr. Vivian said in his opinion it was unwise to bring most workers directly into partnership—they should be introduced through a trade investment society, upon the lines of which wide developments were possible. Mr. Charles Hunt testified, from personal experience as a Director, to the cordial feeling existing between the profit-sharing employees and the Crystal Palace District Gas Company. They were all actuated by a desire to do their best for the concern; and such a result as this was worth striving for. Other speakers followed.

Bristol Water Company.—In the report of the Directors of this Company adopted at the annual meeting on the 28th ult., it was stated that the ordinary revenue from water-rates for the past year was £134,601; being an increase of £3789 on that of the previous year. In addition to this, a sum of £1400 was received on revenue account on the settlement of an outstanding claim for water supplied in previous years. The net sum shown by the revenue account, including £3651 brought forward and the £1400, to be applicable for dividend on the ordinary capital was £57,781, out of which the Directors paid on Oct. 14 an interim dividend at the rate of 7½ per cent. per annum on the ordinary shares, and of 5¾ per cent. per annum on the 7 per cent. maximum consolidated ordinary stock; leaving £31,429 applicable for dividend on the ordinary capital. The Directors recommended the payment of final dividends at like rates, leaving a balance of £4618 to be carried forward. The increase in the water-rates during the year was very satisfactory. The capital expended in that period amounted to £78,625; and the length of mains laid was 15 miles.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Tuesday, under the presidency of Mr. Chas. Lawler, J.P., the Chairman.

The Secretary (Mr. Francis T. Cotton) having read the notice convening the meeting,

The Chairman moved the adoption of the report and accounts, particulars from which were given in last week's "Journal," p. 846. He said the shareholders would see from the accounts that the Company sold 730,244,000 cubic feet of gas during the six months under review, which was an increase of 2,047,000 cubic feet over the corresponding period of the previous year. For this, and meter-rents, they had received £139,941, or a decrease of £8394. The cause of this decrease was the reduction of 3d. per 1000 cubic feet in the price of gas, as from the beginning of 1902. Notwithstanding this, however, the Directors had made a further similar reduction, to take effect from the commencement of the current half year, which alone would amount to nearly £17,000 a year, all of which went to the benefit of the consumer. The Board looked forward to being in a position to make a still further reduction during the present year. The receipts from coke in the six months amounted to £16,057, or a decrease of £1290; and from breeze, £973, or a decrease of £15. The receipts from sulphate and ammoniacal liquor were £924 less; while, on the other hand, tar realized £376 more. The net decrease in the income from gas and residuals was £10,248. There was an increase of 2855 in the number of slot meters during the half year. The number at present in use was 13,620; and the demand for them still continued. There was also an increase of 2555 in hired cookers; the number now in use being 14,292. The Directors had completed their arrangements for taking in charge consumers' incandescent burners, mantles, &c. At the present time, though they had not advertised, they had over 10,000 incandescent burners in charge, including some of the principal churches and buildings in the city. The Board would do the work free, and only charge for the materials used, which they were in a position to obtain at the lowest wholesale prices.

Mr. Maurice Brooks, D.L., seconded the resolution; and it was carried.

Dividends were afterwards declared at the rates of 10 per cent. on the old shares and 7½ per cent. on the new.

Mr. Francis M'Bride, J.P., in proposing a vote of thanks to the Chairman and Directors, said it was gratifying to find that, notwithstanding the reduction in the price of gas, they were still enabled, through the efforts of the Board in the direction of economy and efficiency, to maintain their dividend. It must be good news for the consumers that the Directors were enabling them to participate in the prosperity of the Company, and held out to them hopes of increased reductions in the future.

The Chairman responded; and a like vote to the officers (on whose behalf Mr. Cotton returned thanks) concluded the proceedings.

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EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Offices, St. Helen's Place, E.C., last Thursday—Mr. G. BANBURY in the chair.

The SECRETARY (Mr. I. A. Crookenden) read the notice convening the meeting, and the report and accounts, the principal features of which were dealt with in the "JOURNAL" for the 24th ult., were taken as read.

The CHAIRMAN said he had received a letter from Colonel Lockwood (the Chairman of the Company), stating that he had to attend a meeting of the Grand Committee on Law at the House of Commons, which was fixed for that day at twelve o'clock. As, therefore, he could not attend the Company's meeting, he had asked him (Mr. Banbury) to read the written report which he had prepared to address to the proprietors. Colonel Lockwood began by observing that, so far as actual figures were concerned, his statement was not perhaps quite all that the shareholders could have wished. The business, however, was one that was subject to influences over which the Directors had no control—such, for instance, as the weather and trade; and the latter operated more or less over the enormous area which the Company supplied. Dealing with the revenue account, maintenance charges proper—that was, repairs, pumping, filtration, salaries of Engineers, &c.—showed an excess of only £58 on the corresponding period of 1901; while rates and taxes, which was an item over which the Directors had no control, were £7000 more, and the bought water was less by £400. Upon the whole, the total expenditure on revenue account had increased by nearly £8000; but, as just stated, rates and taxes accounted for the bulk of the increase. On the revenue side, there was an unusual lessening of the rate of increase of water-rates as compared with the corresponding period of last year. Two distinct influences causing this result could be traced—first, that the cessation of the war produced slackness in trade which operated directly upon the Company's meter services return; and, secondly, that although no weight of water fell through the summer and autumn, there was just enough sprinkling of rain to obviate the necessity for the usual road-watering, which was another source of income. These and other circumstances, which he need not more fully describe, had resulted in this position—that while in the corresponding period of last year there was an advance in water-rates of £12,400, the increase for the period under review was only £2608. These circumstances, however, did not warrant any pessimism. On the contrary, while the deficiency of average rainfall had been apparently of unusual extent and duration—existing for nearly ten years—there were many indications that the cycle was broken, and that one might now fairly hope for some abundant rainfall for probably as long a period to come. With regard to the Company's general financial position, *primâ facie* they did not appear to be so well off as they were a year ago. They then carried forward upwards of £17,000 after paying a dividend at the rate of 8 per cent. per annum; but that half year was benefited by £29,639 brought from the account for Midsummer, 1901. In the past half year (Christmas, 1902), they brought forward £21,173 only from the account for Midsummer, 1902. The difference—about £8500—added to the advance of £7000 in parochial rates, and the increased interest on debenture stocks, £3916, making a total of £19,416, exceeded by £2300 the amount of the balance carried forward at Christmas, 1901. Therefore, subject to these variations and to those which he had previously mentioned, which did not really affect the stability of the Company, the business was progressing at a perfectly satisfactory rate. He thought it only right to state, before leaving the revenue account, that the constant service which the Company initiated many years ago, before any of the other Water Companies consented to adopt the new system, was an entirely voluntary act on their part during "periods of drought, frost, or other accidents;" and though upwards of £50,000 had been expended in the purchase of water from other Companies during the past three half years, yet this water was not supplied under the terms of the Metropolis Water Act, 1899, introduced by the Government, and known as the Intercommunication Act, because it had never been declared to be "emergency water," either in fact or expectancy. The Directors determined, at all costs, that the constant service should not be interrupted, and therefore this money had been freely and ungrudgingly spent. Upon this he desired to draw the proprietors' attention to the memorandum of the Company's Auditors which appeared in their certificate—namely, that although the Company debited the revenue account with the whole of the cost of the water bought during the past six months (£24,614), they considered that the price of the water in store at the end of the half year (amounting to 817 million gallons, the value of which was £12,101) was a fair asset. The Directors would bear this in mind at the proper time. With regard to the works, they were in most excellent and efficient order. Nothing had ever been spared in keeping up the plant to the highest possible condition. The new reservoirs and the other works necessary to meet the Company's extending business were well forward. They had nearly 400 million gallons in the new Lockwood reservoir, and their Warwicks and the old reservoirs, containing 1200 million gallons, were, of course, full. The Directors hoped to turn the water into the Banbury reservoir on the following day [last Friday]. In all probability, therefore, the Company's reservoirs and the river would be full during the ensuing season. With reference to the Metropolis Water Act of last session, as he told the proprietors at the meeting in October last, there were some points of ambiguity which had to be elucidated; for instance, the liability of the Water Board for the whole of the expenses incurred and to be incurred. These and some other matters of detail had been fairly adjusted. The "appointed day" had been extended to June 24, 1904, or such other day as the Local Government Board might appoint; but a provision had been inserted that no earlier day than June 24, 1904, should be appointed as respected any Metropolitan Water Company, except with the consent of the Company and the Water Board. He therefore thought that practically all difficulties and doubts had been fairly cleared away, and they might now settle

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down to approach each other as men of business—on the one side, a public body desirous of purchasing, and, on the other, the proprietors of a good going concern not resisting purchase on fair and equitable terms. There were many precedents for these transactions, and no doubt the Court of Arbitration, which was a most competent body, would do that which was right and fair between the parties. The officers, with expert assistance, were engaged in preparing the Company's claim, which had to be deposited with the Court on or before the 16th prox. The order of the Court of Arbitration also provided that the Company's claims should be forwarded to the Water Board, and the answers of the Board to the claims were to be sent in to the Court week by week, commencing on the 17th of August. These answers were to be sent forthwith by the Court to the Companies concerned; and unless terms were settled between the parties, the question would go to arbitration. The most experienced and skilful members of the Bar had been retained to protect most amply and fully the interests of the stockholders. The Directors were convinced that they had a very good case. The Company was a sound and prosperous one as it stood, with a valuable prospective business for the carrying on of which they had efficient plant; and they were confident that the proprietors need be under no apprehension as to the result. It seemed rather hard, just when all looked so hopeful for the future, and after going through all the trials of the last ten years, that their undertaking should pass out of their hands. But they must bow to the inevitable; and all that was left to them was to be very careful that they received fair and proper consideration for the valuable undertaking they were compelled to sell. Mr. Banbury then informed the proprietors as to what had lately been done in regard to the arbitration, and concluded by moving the adoption of the report and accounts and the payment of a dividend at the rate of 8 per cent. per annum (less income-tax) on the ordinary stock for the half year ending Christmas last.

Sir HERBERT BARNARD seconded the motion.

The CHAIRMAN, in answer to Mr. Newby, stated that he did not think there was any doubt that the debenture stockholders would receive an amount of stock which would give them the equivalent of the income they had been receiving, regard being had to the point urged by Mr. Newby, that the interest on that stock was paid free of income-tax—a provision which had been sanctioned by Parliament.

The resolution was unanimously adopted.

On the motion of Mr. F. TENDRON, seconded by Mr. C. J. BONE, the retiring Directors (Mr. Banbury and Sir G. C. T. Bartley, K.C.B., M.P.) were afterwards re-elected.

The CHAIRMAN, in reply, said he would sever his connection with the works with great regret. He had been present at the "birth" of many of them; and they would remain as memorials of the foresight and skill of their Engineer (Mr. W. B. Bryan, M.Inst.C.E.) long after all who were now connected with the Company, and long after the present new Water Board, had passed away.

Mr. F. TENDRON afterwards proposed a vote of thanks to the Chairman, Directors, and officers of the Company, especially the Secretary and the Engineer. He remarked that Colonel Lockwood had often fought the battles of the Water Companies in the House of Commons, and the proprietors were also greatly indebted to him for his services when the Bill for the acquisition of their undertakings was before the Committee. Before the undertaking was passed over to the Water Board, he hoped that a tablet might be placed on the principal engine-house, or somewhere else, referring to the fact of the construction of the works from Mr. Bryan's designs, so that their Engineer's name might in that way be perpetuated with the works.

The motion was carried unanimously.

The CHAIRMAN briefly acknowledged the vote.

ELECTRIC LIGHTING NOTES.

Depreciation of Electric Lighting Plant.

According to a table compiled by a correspondent of the "Financial Times," only five of the Metropolitan Electric Light Companies allow 2½ per cent. or more for depreciation. They are the Chelsea (2·5 per cent.), Brompton and Kensington (3·17 per cent.), Kensington and Knightsbridge (3·13 per cent.), Westminster (3·33 per cent.), St. James's and Pall Mall (3·66 per cent.). The City of London wrote off 2 per cent.; but the South London could only afford 0·18 per cent., the Metropolitan 0·58 per cent., and the Notting Hill 0·68 per cent.

Letter Sorting by Candle Light.

The authorities at the Mount Pleasant letter and newspaper sorting department of the General Post Office recently prevailed upon their superiors at headquarters (though with some difficulty, it is said) to provide a store of candles for use in case of failure on the part of the electric light, with which the building is furnished, to do its work. The wisdom of this step was amply manifested on Monday morning of last week, when, at about 4 o'clock, without the slightest warning, the whole place was plunged in darkness. Some 800 men were at the time hard at work on the outgoing mails; and for a brief space there was great confusion. Soon, however, 1500 candles were forthcoming; and for an hour-and-a-half the letter sorters were to be seen rushing about with guttering candles in their hands, while outside the building bicycle lamps were requisitioned. It was reported that the failure of the electric light was through the bursting of a steam-pipe.

Mr. Halliwell's Comparisons of Gas and Electric Lighting.—The figures given in the paragraph on the above subject in the "JOURNAL" last week (p. 844) were based on gas at the maximum Littleborough rate of 3s. 1d. per 1000 cubic feet, and electricity at 8d. (not 3d. as stated) per unit. The latter is the price agreed upon for the supply to the new Central Board School.

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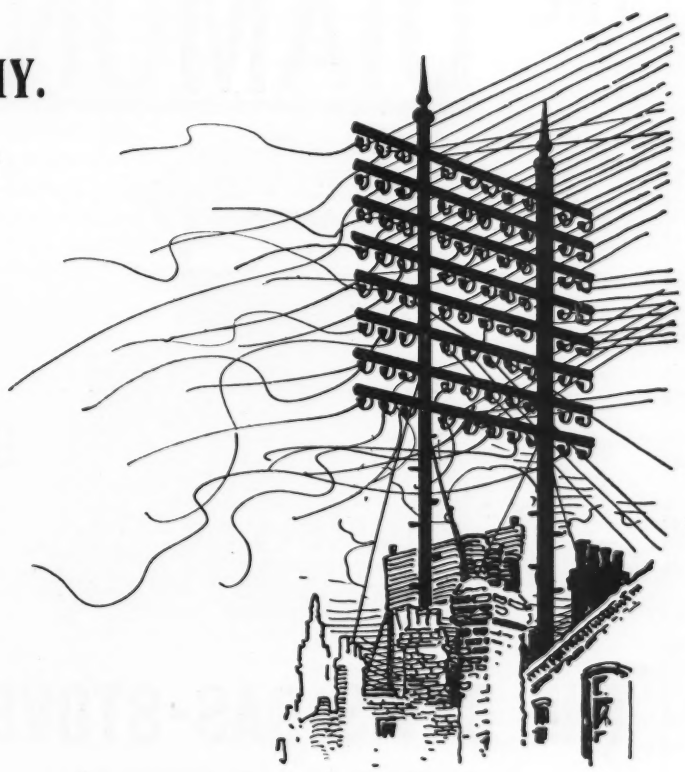

METROPOLITAN WATER BOARD.

The First Meeting.

In compliance with the order of the Local Government Board, issued a few weeks ago under the provisions of the Metropolis Water Act, 1902, the first meeting of the above-named Board, constituted by the Act, was held last Thursday afternoon, in the Council Chamber of the Privy Council, Whitehall. There was a full attendance of members (only two being absent), of whom a complete list was published in the "JOURNAL" for the 17th ult. (p. 712); the only change having been the substitution of Mr. T. Lyne for Sir Charles Scotter, as the representative of the Kingston Town Council and several neighbouring Urban District Councils.

Mr. ALMERIC FITZROY, the Clerk to the Council, presided at the opening of the proceedings, and briefly explained that he had been appointed by the Local Government Board to occupy the chair, and that the principal obligation resting upon him was to invite those present to proceed to the election of a temporary Chairman.

Sir J. Ritchie was thereupon chosen for the office, and the consideration of the questions upon the *agenda* was commenced.

Mr. LIDIARD (Wandsworth), dealing with the first subject set down, moved that the question of assigning salaries to the offices of Chairman and Vice-Chairman of the Board should be adjourned, as they did not know what the duties would be.

Lieut.-Col. COLVILE (Kensington) moved that the salary of the Chairman be £2000 per annum.

This proposal gave rise to a long discussion, in the course of which opinions both for and against payment were freely expressed.

Mr. DICKINSON (London County Council) proposed that there should be no salary. He said the Board required a good Solicitor, Engineer, Clerk, Valuer, and Accountant. When they had these, he ventured to think that a paid Chairman would do more harm than good.

Eventually the question was adjourned.

The remaining business consisted of a decision to request Mr. A. V. Symonds to act as Clerk of the Board until other arrangements could be made, and the appointment of a Committee, consisting of the Chairman and 22 members, to consider and report upon the following matters: (1) The duties to be assigned to the offices of Chairman and Vice-Chairman. (2) The securing of temporary offices for the conduct of business. (3) The day and hour most convenient for the meeting of the Board. (4) The steps to be taken to secure the services of the following officials: (*a*) Clerk, (*b*) Solicitor, (*c*) Engineer, (*d*) Financial Adviser. (5) The Committees which should forthwith be appointed, and the number of persons of whom they should consist. The Committee were afterwards nominated, and empowered to make preliminary arrangements with the Local Government Board in regard to the provision of funds required to meet the immediate expenses of the Board.

A vote of thanks was accorded to Mr. FitzRoy for his services in the chair and for the use of the room; and the meeting was adjourned to the 23rd inst., at some place to be fixed by the Committee.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards sold, by order of Directors and others, stocks and shares in the Hastings, Brentford, Reigate, and Grays Gas Companies. The first-named Company offered £10,000 of new additional 5 per cent. ordinary stock, ranking for a standard dividend at this rate, subject to the sliding-scale, but entitled, in view of the dividends paid on the existing stocks of the Company for the past eighteen months, to £6 1s. per cent. per annum. The whole of the issue was placed at prices ranging from £125 to £126 per £100 of stock. Some consolidated stock of the Brentford Gas Company, carrying dividend at the rate of 12 per cent. per annum, fetched £240 and £242 per £100 lot. A small quantity of stock of the Reigate Gas Company, carrying 12 per cent., free of income-tax, was sold for £230 per £100 of stock. Some fully-paid £10 "B" shares in the Grays Gas Company (last dividend at the rate of 5¼ per cent. per annum) fetched from £10 2s. 6d. to £10 10s. each. On Thursday, Messrs. Hall, Pain, and Goldsmith sold 2000 new ordinary £5 shares (5 per cent.) in the Portsmouth Water Company—1920 at £6 10s. 6d. each, and the rest at an advance of 2s.; the total amount realized being £13,010. A similar number of shares sold last December brought £12,683, and others offered a few months previously realized £12,746.

Gas Workers in the Provinces.—The completion of the occupational results of the census so far as regards England and Wales is notified by the publication of the five remaining volumes relating to Montgomery, Anglesey, Flint, Radnor, and Rutland, in which counties 13, 16, 37, 6, and 14 persons were respectively enumerated as employed in connection with gas-works.

Increased Gas Consumption at Prescot.—The accounts submitted at the recent annual meeting of the Prescot Gas Company showed that the gas-rental for the year ending Dec. 31 was £5499, as compared with £4828—the preceding twelve months; while the miscellaneous receipts increased from £1512 to £1616. The Manager (Mr. John E. Hall) reported an increase in the quantity of gas sold of 3,957,000 cubic feet, or 14·12 per cent. A Maxim-Clark carburettor has been installed at the works, with excellent results.

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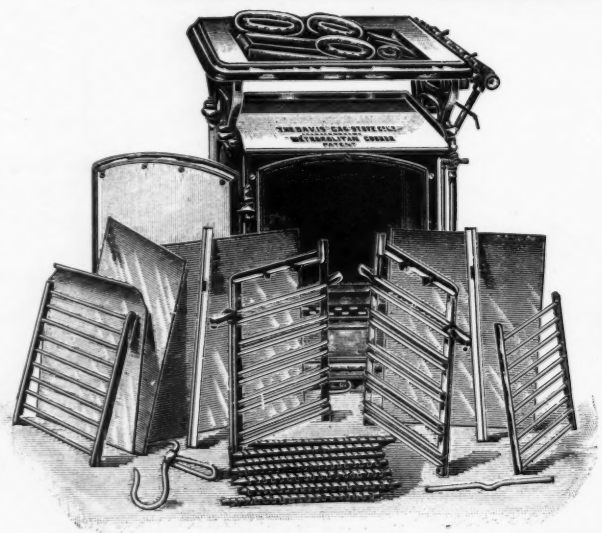

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The burghers of the ancient Royal Burgh of Dumbarton, whose Charter was granted by King Alexander II., in 1222, held high gala last Saturday, on the occasion of three important ceremonies which arose out of municipal work. In the first place, Lady Overtoun opened new municipal buildings, the erection of which had been rendered easy of accomplishment through the generosity of her husband, Lord Overtoun; then a visit of inspection was paid to the Corporation gas-works, which have been very largely remodelled and modernized; and afterwards the freedom of the burgh was conferred upon Lord Overtoun. All the ceremonies were carried through successfully, in the presence of about four hundred invited guests.

We are concerned only with the gas-works. There was no formal ceremony, the visitors merely walking through the works; seeing and admiring the working arrangements that prevail in that busy hive, which is described as one of the best assets of the town. The works which have been completed at this time consist of a doubling of the capacity of the retort-house; the extension of the coal-stores, which are now capable of containing 1600 tons; a new purifier-house, fitted with labour-saving appliances; the formation of railway sidings into the works, &c. The gas-works at Dumbarton date back to 1829. In 1873, they passed into the hands of the Corporation; the purchase price consisting of annuities issued at the rate of 9 per cent., with a provision that the Corporation could buy up the annuities at 25 years' purchase—in other words, £10 of stock was made of the value of £22 10s. When the transfer took place, the price of gas was 6s. per 1000 cubic feet, with meter-rents. On the first year's working, there was a loss. Wet meters are now supplied free, and the price of gas, which is at present 3s., has been as low as 2s. 6d. per 1000 cubic feet. There has been a continuous increase in the consumption of gas, in some years as much as 14 per cent. Last year the consumption was 76 million cubic feet. The site and also the works have been largely increased in size during the ownership of the Corporation. There are now 2¾ acres within the walls. One of the later additions was the incorporation of the old prison grounds; and in this connection, it may be stated that the purchase of these grounds brought into the gas-works the burial-place of the last two men who were executed within the burgh. Their graves are now within the purifier-house; but it was not found necessary to disturb them. There are three gasholders, with a total capacity of 300,000 cubic feet. This is now the weakest part of the works, the maximum daily output of gas being 425,000 cubic feet. In winter there is a daily consumption of 40 tons of coal. Provision is made for the delivery by rail of coal and lime, and for the despatch by rail of coke, tar, and liquor. Lavatory accommodation, including a bath, with hot and cold water service, is provided for the workmen. The total cost of the recent additions and improvements at the works has been about £15,000. The management of the gas-works has been in the hands of, in 1829, Mr. Robert Kirk, whose son is at the present time the Father of the Town Council; and afterwards of Mr. Renton, who went to Montrose; Mr. Whitecross, who died in office; Mr. W. Key, now a Ventilating Engineer in Glasgow; and Mr. James M'Gilchrist, who has held the office since the end of the first year of Corporation ownership. His record of nearly thirty years makes him the oldest servant of the Municipality. All those who know Mr. M'Gilchrist will acknowledge that he has been one of the most able and painstaking employees of the town, as he has been one of the most successful of Gas Managers.

At North Berwick, to the Corporation of which Mr. M'Gilchrist is Consulting Gas Engineer, tenders have this week been received for the pipes and the gasholder in connection with the scheme for the erection of new gas-works which has been agreed upon.

The interminable question about a site for the new gas-works at Falkirk was the subject of discussion at the annual meeting of the Falkirk Building Society on Thursday night. That this body had some reason to take the matter into consideration was brought out, and, I think established, in the report of the Committee. The Society had at present nearly £12,000 worth of property in hand, and were interested, as lenders, in about £50,000 worth more, all within the burgh. They had been advised by their Law Agent that the question was a proper one for the meeting to deal with; and having given due weight to all the facts and arguments, and specially to the reports on the Parkhouse site, they had come to the conclusion that it was their duty, as a Society, to protest against the erection of gas-works there; and they recommended accordingly. A resolution to that effect was adopted; and it was ordered to be sent to the Town Council for their consideration.

I have already mentioned the action in the Sheriff Court of Forfarshire by Messrs. D. & W. Chapel, Solicitors, Arbroath, against the Corporation of Arbroath, in which the pursuers sue for the balance of their business account for work done on behalf of the Gas Corporation. Mr. D. Chapel was for many years Clerk to the Gas Corporation. The question has been raised by the Burgh Auditor objecting to certain items; his view being that they were covered by salary. The accounts were sent to the Auditor of the Court of Session, who disallowed two accounts. Sheriff-Substitute Lea, upon objection being taken to that as being *ultra vires* of the Auditor, ordered proof of employment. Appeal was taken to Sheriff-Principal Johnston, who has recalled the decision, and sent the accounts which were disallowed back to the Auditor of the Court of Session to be taxed, not disallowed; and he directs that, after this is done, the Sheriff-Clerk Deputy of the county is to inquire into the practice which was followed in remunerating Mr. Chapel for work done during the thirty years he was Clerk. In his opinion, the question can only be decided by taking account of the terms of the engagement of Mr. Chapel as disclosed by the custom of the parties.

A Parliamentary Commission has been sitting in Edinburgh during

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT, MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000		

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

the past eight days, considering applications under the Private Bill Procedure (Scotland) Act, for Provisional Orders giving legislative powers. The Commissioners were four in number, consisting of two members from each House of Parliament. With the exception of Mr. Shiress Will, K.C., all the Counsel engaged in the inquiries were members of the Scotch Bar; so that the end has been gained of giving Scotch Counsel the leading place in the promotion of legislation for Scotland. In the few years in which the Act has been in force, it has given satisfaction to all parties, so that the scheme can now be recommended as a workable one. Two of the measures promoted on this occasion related to water supply—at Irvine and Grangemouth; and both were passed, without much opposition. Another of the Orders applied for was by the North British Railway Company, who sought powers to construct or alter portions of their lines. Their application originally included the construction of a branch railway at Thornhill, Falkirk, which was to serve the gas-works which the Corporation intended to erect there; but the Corporation having rejected the site, and there being, in the meantime, no prospect of gas-works being erected there, the Railway Company struck the clause out of their application, and the Order was granted without it. In this way, should the Corporation re-adopt Thornhill as the site—which is not impossible—at least a year's delay has been imposed in the carrying out of a claimant work.

One good effect of the heavy rains this year has been the replenishment of the gathering-grounds for town water supplies. Those of Edinburgh, in particular, were much in need of this, as some of the reservoirs were very low at the beginning of the year, and the springs were failing. Everything is now running full; and for the present, at least, all fears of a water famine are set at rest.

One of the places where there was anxiety as to the water supply was Kirkcaldy. Indeed, it may be said that the trouble has not yet been removed, for, although there is abundance of water, a leak has been discovered in a new reservoir at Holl. A pipe below the embankment is believed to be cracked. Under the advice of Mr. E. P. Hill, of London, the Water Commissioners are having the reservoir emptied; and he proposes to line the 36-inch pipe with iron segments, at a cost of about £700. A proposal has also been made to tunnel the embankment; but Mr. Hill disapproves of this being done. The Commissioners have delayed coming to a decision on the matter till the reservoir is empty.

Gas, Water, and Electric Lighting Profits at Darlington.—The trading concerns of the Darlington Corporation are in a flourishing condition. The profits on the gas-works for the past year amounted to £9668, which has permitted of the relief of the rates to the extent of nearly 1s. in the pound. The profit on the water-works was £6648, which makes a total relief of the rates by the two undertakings of 1s. 8¾d. in the pound. The accounts of the Electric Lighting Committee have not yet been presented; but they also are expected to show a balance on the right side of between £300 and £400.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 4.

Sulphate of Ammonia.

After completion of March requirements, the market assumed a quieter tone, and in the Liverpool district there have been resales at a substantial decline on last week's prices. Makers, however, have for the most part been firm, and the closing quotations are £13 5s. per ton f.o.b. Hull, £13 7s. 6d. to £13 10s. per ton f.o.b. Liverpool, and £13 12s. 6d. per ton f.o.b. Leith. These prices are also quoted for April and May delivery. Farther ahead, interest has declined, buyers refusing to follow the advance which makers ask for July-December. For October-March there are sellers at £12 10s. per ton f.o.b. Leith.

Nitrate of Soda.

This is firm at 9s. 3d. to 9s. 6d. per cwt., but notwithstanding the increase in deliveries from the ports, January-March, 1903, over January-March, 1902, of 115,000 tons, no serious attempt has been made to advance prices substantially. The visible supply, U.K. and Continent, at the end of March showed a decrease of 135,000 tons, and there were only 112,000 tons of stock at the end of April last year to carry forward into May; so that with anything like the past year's deliveries in April the stock to carry forward this year into May is bound to be dangerously small.

LONDON, *April* 4.

Tar Products.

There is but little fresh business to report, the markets being very quiet indeed. Pitch remains in about the same position. There is really no business doing, and at present consumers hold off the market as regards forward delivery. There is, however, very little offering; distillers evidently being inclined to show a considerable amount of caution in contracting forward. In benzol, business has been done at 7½d. for 50-90 per cent. in the North, while 9d. was accepted for 90 per cent. in several instances at outports for export. In solvent and toluol, there is nothing whatever doing. Consumers do not seem to take any interest in these articles. Anthracene remains in precisely the same position. There is, however, a fairly good inquiry for forward delivery. Crude carbolic continues in good demand at 1s. 6d., at which considerable quantities have been placed for April-May delivery. It is reported that offers of 1s. 6½d. have been declined by makers for delivery up to the end of the present year. The market for crystals remains quiet; but there is an absence of business in England, the orders being evidently monopolized by German producers. Creosote continues in fairly good demand, especially as regards London.

The average values during the week were: Tar, 22s. 6d. to 28s. Pitch, London, 58s.; east coast, 55s. to 55s. 6d; west coast, 53s. to 54s. Benzol, 90 per cent., 9d.; 50-90 per cent., 7½d. Toluol, 7d. Crude naphtha, 3d.; solvent naphtha, 8d. to 9½d.; heavy naphtha, 9d. Creosote, London, 1½d. to 1 1/16d.; North, 1¼d. to 1 5/16d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6d. Naphthalene, 35s.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 100 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Southport, Alloa, Broughty Ferry, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET BISHOPSGATE, LONDON, E.C.

to 55s.; salts, 22s. 6d. to 25s. Anthracene, "A" 1⅝d. to 1¾d.; "B" 1d. nominal.

Sulphate of Ammonia.

The market is very firm; and there is really very little offering for April delivery. The Gaslight and Coke Company decline to quote in any position; but another large London Gas Company have sold at £13 12s. 6d., and are reported to have declined this price for a further quantity April shipment. In Leith, £13 11s. 3d. and even £13 12s. 6d. are reported to have been paid for prompt shipment; but business is limited, owing to the absence of supplies. In Hull, sales were made for prompt at £13 8s. 9d.; but for April-May, consumers offer only £13 7s. 6d. In Liverpool, a small business is reported for prompt shipment at £13 10s.; but consumers are evidently not anxious to purchase at this price.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The Lancashire colliery owners have not yet followed in any general way the Yorkshire downward move in round coal prices. One or two collieries, as anticipated last week, have taken independent action, and made some reduction on their list rates varying from about 6d. to 1s. per ton. The Associated Collieries have, however, made no official move—in fact, the question of lower prices has not as yet been brought forward for consideration, either in the Manchester or the South-West Lancashire districts. The isolated reductions which have come into operation this month may probably be the thin end of the wedge; and with lower prices also ruling in surrounding districts, it would scarcely seem likely that the Lancashire coalowners can maintain their present position. Representatives of one or two large collieries already announce that, if isolated reductions are to be put in force, they can scarcely hold out from following, as they do not intend that their trade shall be cut into more than they can help. Very few of the house-coal collieries are working more than four days—some of them not more than three days—per week. At the pit mouth, best Wigan Arley coals only in special cases are firm at 15s.; 14s. to 14s. 6d. representing more nearly average prices. Lower qualities of Arley and Pemberton four-feet are to be bought at about 12s. to 12s. 6d. up to 13s. per ton at the pit, and the commoner qualities of house coal at 10s. to 11s. The lower descriptions of round coal continue in fair request for ironmaking, steam, and general manufacturing purposes. At the pit mouth, steam and forge coals do not average more than 8s. 3d. to 8s. 9d., and on shipping orders from 7s. 9d. to 8s. has been taken for steam coals at the pit, representing about 9s. 6d. to 9s. 9d. delivered at the ports on the Mersey, although for special qualities about 3d. per ton above these figures is here and there being secured. With regard to gas coals, although there are a good many quotations now out, nothing of any moment has yet been settled; and as many of the gas companies hold considerable stocks as a result of the exceptional character of the winter season, there is no great hurry about renewing contracts for the ensuing twelve months. So far, Lancashire collieries, as previously stated, have been quoting upon last year's basis; but users of gas coal are all anticipating some concession upon the prices paid in 1902. As to the possible course of the market, it would seem not unlikely that a reduction of about 6d. per ton may be pretty general upon the contract prices which were ruling last year. All descriptions of engine fuel continue exceedingly strong, with an upward tendency—collieries as a rule quoting advances of 3d. to 6d. per ton on all new business; and it is more than probable that slack, owing to the restricted production during the winter, will go on stiffening during the ensuing summer. At present, prices of slack are exceedingly firm at about 4s. 6d. up to 5s. per ton at the pit for the common sorts, 5s. 9d. to 6s. 3d. for medium qualities, and 6s. 9d. to 7s. 3d. for the very best qualities.

Northern Coal Trade.

The coal trade has been a little more active, and one or two heavy contracts have been decided during the past few days, including a large one for Cronstadt, which seems likely to leave about 10s. 3d. per ton f.o.b. for best steam coals. This is 6d. or 7d. per ton below the price paid under the same contract a year ago, so that the drift of the market is clearly shown. For occasional cargoes for prompt delivery, the price is 10s. per ton f.o.b., some of the collieries being rather short of trade; second-class steams are about 9s., and steam smalls from 5s. 6d. to 5s. 9d. In the gas coal trade, the demand is possibly a little fuller, in preparation for the holidays; but some of the great users of gas coals have evidently accumulated large stocks. The price for cargoes is from 8s. 3d. to 8s. 9d. per ton f.o.b. for Durham coals, according to quality; while there is rather more variation in the price when contracts are being arranged. There is as yet nothing done as to the large contracts for the Metropolis, though the negotiations should be soon begun if last year's example be followed. In coke, the market is brisk at higher prices; and this stiffens gas coke, which is steady at from 12s. 6d. to 13s. per ton f.o.b. in the Tyne. There should soon be a larger export of gas coke; and there is now some diminution in the production.

Scotch Coal Trade.

Quietness is still the ruling feature of trade; there being difficulty in getting outputs disposed of. Prices are scarcely maintained; splint, in particular, being weak. Ell is in greatest demand. The prices quoted are: Main 8s. to 8s. 3d. per ton f.o.b. Glasgow, ell 8s. 9d. to 9s. 9d., and splint 9s. 6d. to 9s. 9d. The shipments for the week were 166,764 tons—a decrease of 20,463 tons upon the preceding week, and of 31,363 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,211,918 tons—an increase of 78,349 tons upon the same period of last year.

The Scarborough Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for a 2 million cubic feet per day Livesey washer.

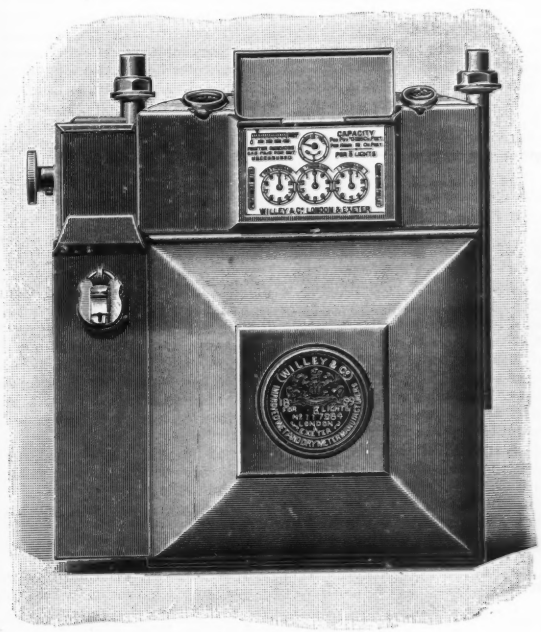
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LONDON AND EXETER.

Gas-Works Extensions at Luddendenfoot.—The Sowerby Bridge Urban District Council are applying to the Local Government Board for a loan of £7500 for gas-works purposes. At the inquiry which was held last Friday, it was stated that last winter the inhabitants of the Luddendenfoot district complained bitterly of the unsatisfactory supply of gas; and it was for extensions at the works there that the money was required. There was some opposition owing to the fact that the Luddendenfoot consumers are charged a higher price for gas than those at Sowerby Bridge; but the Inspector (Mr. E. A. Sandford Fawcett) said he thought this was a matter for local arrangement.

Crystal Palace District Gas Bill.—This Bill was before the Court of Referees, presided over by Mr. Parker Smith, last Tuesday, on the question of granting the London County Council *locus standi* in opposition. It was contended on behalf of the Council that they had a right to oppose for the protection of the consumers in the portion of the Company's area within the County of London. The Company, on the other hand, urged that the right to oppose rested with the Borough Councils, one of whom (the Lewisham) had taken up the same points as the County Council, and that consequently they would be dealt with. It was found, however, on consulting precedents, that *locus standi* had been allowed in similar cases; and accordingly it was granted here.

The Margate New Water-Works.—The foundation-stone of the new Margate Water-Works at Wingham was laid last Friday, by the Mayor (Mr. J. J. Hermitage), who was presented by the Engineer (Mr. Albert Latham) with a silver trowel, suitably inscribed, as a memento of the occasion. After the ceremony, the company were entertained at lunch by the Engineer and the Contractor for the works (Mr. G. Browning). Replying to a toast, Mr. Macfarlane, the Chairman of the Water Committee, said that, both as regarded quantity and quality, Margate had before it a water supply for all time. They would acquire the monopoly of water supply over an area of more than 50 square miles. The Committee had already been asked to furnish certain outlying parishes with water; and it was probable that the seaside resorts in Thanet would also desire to be supplied.

New Joint-Stock Companies.—The Kitson Incandescent Lighting Company of South Africa, Limited, has been registered with a capital of £50,000 in £1 shares, to "acquire any patents, licences, concessions, &c., relating to any invention which may seem capable of being used for the production of artificial light or heat; to adopt an agreement for the acquisition from the Johannesburg Consolidated Investment Company, Limited, of the benefit of certain existing patents, patent rights, and other benefits in relation to the inventions comprised therein; to exercise, develop, grant licences in respect of, and turn to account, any patents, rights, and benefits so acquired; to construct lamps, apparatus, stores, and works; and to carry on the business of a lighting and heating company in all its branches." The Manchester Lamp and Gas-Fitting Company, Limited, with a capital of £3000, in £1 shares, is to acquire the businesses of dealers in lamps, gas-fittings, mantles, &c., now carried on by Phyllis Hall as the Manchester Lamp and Gas-Fitting Company, the Manchester Lamp Company, and the Oldham Lighting Stores, in Manchester, Oldham, Stockport, and elsewhere.

The Geltsdale Water Scheme.—A special meeting of the Carlisle Town Council was held last Tuesday, under the presidency of the Mayor (Alderman Maxwell), to consider the opinion of Mr. Balfour Browne with regard to the carrying out of the Geltsdale water scheme and the following resolutions of the Geltsdale Committee thereon: "That, having regard to the whole of the circumstances, engineering, financial, and otherwise, this Committee is of opinion that it is in the best interests of the city that the carrying out of the Geltsdale water scheme should be proceeded with without delay; and this Committee recommends the Council accordingly. That the Council be recommended to retain Messrs. James Mansergh and Sons, of Westminster, to carry out the scheme; and that this Committee be authorized to interview Messrs. Mansergh with the view of arranging terms." The resolution passed at the public meeting held in the Drill Hall on the previous Wednesday, given in the "JOURNAL" last week (p. 854), having been read, a memorial was presented from the medical faculty in the city expressing the opinion that the Geltsdale scheme was, from a sanitary point of view, the best which had been before the Council. The question was discussed in a sitting which lasted between six and seven hours, and was then adjourned for a month.

The Directors of the Imperial Continental Gas Association recommend the payment of a dividend of 5 per cent. for the half year ended Dec. 31, tax free.

Messrs. Joseph Taylor and Co., of Bolton, have received an order from the Alloa Town Council for a solid-plate lead saturator, fitted with detachable ammonia and acid pipes.

Tenders for 1800 ordinary £10 shares in the Barking Gas Company, entitled to a maximum dividend of 7 per cent., which were invited in the "JOURNAL" a short time ago, were opened on Monday last week. Applications at £11 5s. were allotted in full, and those at £11 will receive about 80 per cent.

A conference of the representatives of the Richmond Gas Stove and Meter Company was held at the Warrington works on the 27th ult. The meeting was presided over by Mr. H. M. Thornton, supported by Mr. J. A. Ransome and Mr. J. W. Glover. In the evening, a dinner was given to these three gentlemen by the whole of the representatives of the amalgamated Companies—namely, the Richmond Gas-Stove branch, the George Glover Meter branch, and the George Newton (Oldham) Meter branch.

Messrs. Mather and Platt, Limited, of the Salford Iron-Works, have just completed what is stated to be the largest single-cylinder gas-engine made in this country. It is double acting, works on the two-cycle system, and is easily capable of developing 700 brake horse power continuously. It is coupled direct to a 500 kilowatt continuous current dynamo wound for 2275 amperes at 220 volts, also built by the firm. The engine will be supplied with Mond gas. Messrs. Mather and Platt are making a 1000 brake horse power gas-engine to drive a 700 kilowatt generator coupled direct on the crank-shaft.

PARKINSON'S

CROWN COOKER

HAS MANY ADVANTAGES.

ENAMELLED INSIDE AND OUT,
PATENT REVOLVING GRILL BURNERS,
HINGED TOP PLATE,
SPECIAL GRILL PAN,
SLIDING MEAT-HOOK,
SELF-LOCKING GRID SHELF,
&c., &c.

PARKINSON AND W. & B. COWAN, LTD.
(PARKINSON BRANCH),
LONDON AND BIRMINGHAM.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ASSISTANT MANAGER. No. 4017.
CANVASSERS. No. 4019.
COLLECTOR AND INSPECTOR. No. 4011. April 11.
DRAUGHTSMEN. Cutler and Sons, Millwall.
FITTER AND MAIN AND SERVICE LAYER. Aberdare Gas Company.
FITTER AND MAIN AND SERVICE LAYER. Holmfirth Gas-Works.
LAMPLIGHTER. Newport (I. of W.) Gas-Works.

Situations Wanted.

AGENCY FOR GAS COAL, No. 4016.
TRAVELLER GAS-STOVE TRADE. W. W., Faversham.

Business for Disposal.

GREENALL'S METER SYNDICATE. Close, Leeds.

Plant, &c., for Sale.

CONDENSER. Redditch Gas-Works.
PURIFIERS, &c. Nantwich Gas-Works.
RETORTS. Shipley Gas-Works.
SCRUBBER-WASHER. &c. Brown, Glasgow
STATION GOVERNORS, VALVES, &c. Gas-Works, Sutton.
TOWER SCRUBBER, &c. Cambuslang Gas-Works.

Plant (Second-Hand) Wanted.

EXHAUSTER. Gas Company, Ceres, N.B.
STATION METER. No. 4018.

Sales of Stocks and Shares.

ALDERSHOT GAS AND WATER COMPANY. April 21.
DOVER GAS COMPANY. April 28.
HORLEY GAS COMPANY. April 28.
NEWCASTLE AND GATESHEAD GAS COMPANY. April 21.
READING GAS COMPANY. April 9.
REDHILL GAS COMPANY. April 16.
SOUTH ESSEX WATER-WORKS COMPANY. April 21.
TONBRIDGE GAS COMPANY. April 21.
WEST KENT GAS COMPANY. April 21.
YORK UNITED GAS LIGHT COMPANY. April 27.

Mortgage Bonds.

SOUTH SHIELDS GAS COMPANY.

TENDERS FOR

Brass Fittings, Lead Pipe, &c.

DEVONPORT GAS DEPARTMENT. Tenders by April 30
WIGAN GAS DEPARTMENT. Tenders by April 13.

Coal and Cannel.

BODMIN GAS COMPANY. Tenders by May 4.
DEVONPORT GAS DEPARTMENT. Tenders by May 9.
NEWPORT (FIFE) GAS DEPARTMENT. Tenders by April 14.

Fire-Clay Goods.

DEVONPORT GAS DEPARTMENT. Tenders by April 30.

Gasholders, Tank, and Alterations.

KNUTSFORD GAS COMPANY. Tenders by April 20.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by April 27.

General Stores, Paints, &c.

DEVONPORT GAS DEPARTMENT. Tenders by April 30.
MORLEY GAS DEPARTMENT. Tenders by April 18.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Lime.

DEVONPORT GAS DEPARTMENT. Tenders by April 30.
MORLEY GAS DEPARTMENT. Tenders by April .8.

Meters.

DEVONPORT GAS DEPARTMENT. Tenders by April 30.
MORLEY GAS DEPARTMENT. Tenders by April 18.

Pipes and Fittings, &c.

DEVONPORT GAS DEPARTMENT. Tenders by April 30.
LEEDS GAS DEPARTMENT. Tenders by April 20.
MORLEY GAS DEPARTMENT. Tenders by April 18.
ST. MARY CHURCH GAS-WORKS. Tenders by April 23.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Purifier, &c.

SOWERBY BRIDGE GAS DEPARTMENT. Tenders by April 27.

Retort Bench, Fittings, &c.

LEEDS GAS DEPARTMENT. Tenders by April 20.
RAMSGATE GAS DEPARTMENT. Tenders by April 11.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by April 27.

Scrubber, Washer, &c.

SOWERBY BRIDGE GAS DEPARTMENT. Tenders by April 27.

Steel Joists, &c.

RAMSGATE GAS DEPARTMENT. Tenders by April 11.
LEEDS GAS DEPARTMENT. Tenders by April 18.

Street Lamps.

GLASTONBURY GAS DEPARTMENT. Tenders by April 18.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Sulphate of Ammonia Plant.

WORKINGTON GAS DEPARTMENT.

Sulphur Tar.

WIGAN GAS DEPARTMENT. Tenders by April 13.

Sulphuric Acid.

BURY GAS DEPARTMENT. Tenders by April 20.
WIGAN GAS DEPARTMENT. Tenders by April 13.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EASTER HOLIDAY.

In consequence of the EASTER HOLIDAY, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office NOT LATER than THE FIRST POST ON SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS.
Correspondence invited.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.
General Manager for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE CEMENT PAINT, GAS COAL.

BALE & CHURCH, 5, CROOKED LANE, LONDON, E.C.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

STREET AND SHOP LAMPS AND LANTERNS.
MARK DUFFIELD & SONS (Established 200 Years), makers of Street and Shop Lamps to own Pattern and Design. Any description of Lamp made. Inquiries invited.
London Manager: EDWARD PADFIELD, West India House, 96 & 98, LEADENHALL STREET, E.C.
Telegraphic Address: "EUPATHY, LONDON."

MOTOR CARS.
MOTOR CARS for Pleasure or Business.
MOTOR VANS for Coin Collecting.
MOTOR TIP LORRIES, and TAR OR OIL WAGGONS.
LAURENCE BELL, Gas and Motor Engineer, INNERLEITHEN and PEEBLES.

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

CAPE TOWN GAS COMPANY.
NOTICE is Hereby Given to the Applicants for the post of MAINLAYER that the positions HAVE NOW BEEN FILLED.
H. YUILL,
Secretary.
35, New Broad Street, London, E.C.

TRAVELLER, with good connection in South Eastern Counties, lately representing good Firm, desires re-engagement. Excellent References. Age 27.
Address W. W., 83, Preston Street, FAVERSHAM.

TO GAS COAL COLLIERY MANAGERS.
A GENTLEMAN having a good connection among Gas Managers in the Midlands, would be glad of an AGENCY for the SALE of a FIRST-CLASS GAS COAL on commission.
Address No. 4016, **care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.**

GAS Fitter, accustomed to House Gas- Fitting and Main and Service Laying, wanted by the Aberdare Gas Company. Permanent employment.
Apply, by Letter, with *copies* of recent Testimonials, and stating Age and Wages, to EVAN JONES, General Manager.

WANTED, at once, Gas-Cooker Can- vasser. First-Class Firm. Exceptional opportunity. Permanent if good results. Salary and Commission. State experience.
Address No. 4019, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Steady Man as Fitter, used to Main and Service Laying, Fixing and Repairing Meters, Cookers, &c. Permanency to a handy man.
Apply with References, stating Age and Wages required, to A. E. BUCKLEY, Gas-Works, HOLMFIRTH.

FOREMAN Lamplighter Wanted. Wages to commence 30s., increasing, if satisfactory, to 35s. Must have had Previous Experience in Incandescent Public Lighting.
Apply, by letter, stating Age and Experience, with *copies* of Testimonials, to the MANAGER, Gas-Works, Newport, ISLE OF WIGHT.

DRAUGHTSMEN required, well up in Working Drawings of Structural Steel Work, and also for Coal-Conveying Plant. Permanent berth for satisfactory men.
State Age, Experience, References, and Salary required, to S. CUTLER AND SONS, Engineering Works, Millwall, LONDON, E.

WANTED, by a Gas Company in the North of England, an ASSISTANT to the Gas-Works Manager. Salary to commence at £100 per annum.
Applications, with not more than three recent Testimonials, stating Age, Qualifications, and Experience, to be sent by post to No. 4017, **care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.**

YOUNG Man wanted at Midsummer next, as COLLECTOR and INSPECTOR at a small Gas-Works near London. Must have sufficient knowledge of Stoves and Incandescent Burners to be able to advise Consumers and report clearly on cause of complaints.
Commencing Salary £80 per annum.
Applications, enclosing *copies* only of Two Testimonials, to be sent in, on or before April 11 next, to No. 4011, **care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.**

REQUIRED, a small Second-Hand STATION METER, to indicate up to 2000 cubic feet per hour. Same must be guaranteed in thorough working order.
Address, stating price, to No. 4018, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHAUSTER, small Whimster's, Wanted.
Address W. KEY, Gas Company, Ceres, FIFESHIRE.

GAS-METERS wanted, old disused Wet. Copper Lamp Frames, Brass, Pewter, Tin, Zinc, Lead Ashes, Old Copper Electric Cable, &c., for Cash.
J. SMITH, Canal Road, BRADFORD.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

A BARGAIN—Water-Cooled Condenser in perfect condition. Capacity 250,000 cubic feet per 24 Hours.
Address A. E. LAYTON, Gas-Works, REDDITCH.

TO BE SOLD, Cheap, Twenty New ⊂ RETORTS, 22 in. by 14 in. and 10 ft. 4 in. long outside.
Apply to the MANAGER, Gas-Works, Shipley, YORKSHIRE.

SCRUBBER FOR SALE.
SPLENDID 8 feet by 60 feet Tower SCRUBBER by Walker for immediate SALE. Erected complete. New Distributor, Wood Boards, &c.
J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

FOR SALE—Four 9 feet square Puri- fiers, complete with 8-inch Centre-Valve, Connections, and Lifting Apparatus. In very good condition. Can work three or four Purifiers as desired. Can be seen at work.
For further Particulars, apply to J. DAVIES, Gas-Works, NANTWICH.

TOWER Scrubber for Sale. In first class condition. 5 ft. by 30 ft., 10-inch Inlet, Outlet, and Bye-Pass Valves, with Connections. Can be seen at Works.
Offers to be sent to ROBERT SIMPSON, Manager, Gas-Works, CAMBUSLANG, N.B.

GAS SCRUBBER-WASHER.
FOR SALE—Holmes "New" Patent SCRUBBER-WASHER, with Mixing-Tank Agitator, Gear Wheels, Engine, Metal Brackets, Runaway Trough, &c. In excellent condition.
Apply to ARTHUR S. BROWN, C.A., 166, St. Vincent Street, GLASGOW.

FOR SALE—Two 8 inch Station GOVERNORS, with Valves, Connections, and Bye-Passes complete. Good condition. Can be seen at the Gas-Works, Reigate.
Offers to be sent to GEO. M. ROBINS, Engineer to the Company, at the Gas Offices, Sutton, SURREY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Very good Gas Plant as under:—
PURIFIERS—Four 12 feet square, with 8-inch Centre-Valve and Connections. Planed Joints.
Kirkham WASHER-SCRUBBER, 300,000 cubic feet per diem., with Engine and 8-inch Valves and Connections.
Livesey WASHER, 250,000 cubic feet per diem, with 8-inch Valves and Connections.
Photos. sent on application to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

RE **GREENALL'S POSITIVE METER SYNDICATE, LIMITED.**

IN LIQUIDATION.

FOR SALE, as a Going Concern—The above-named Business, consisting of the Patent Rights, Plant, and Stock-in-Trade. The Works are situate in Kirkstall Road, Leeds.
For Particulars, apply to the Liquidator, J. W. CLOSE, Chartered Accountant, No. 7, Greek Street, LEEDS.

BOROUGH OF RAMSGATE.
(GAS DEPARTMENT.)

THE Gas and Water Committee desire TENDERS for the following work—viz.:
CONTRACT No. 1.—For rebuilding a RETORT-BENCH of 14 Arches, exclusive of Settings.
CONTRACT No. 2.—For the supply and part erection of RETORT-FITTINGS, HYDRAULIC MAINS, SELF-SEALING MOUTHPIECES, STEEL JOISTS, &c., &c.

Specifications, with Forms of Tender and Schedules of Quantities, may be obtained on application to the undersigned, and Prints of the Drawings will be supplied, if desired, upon payment of £1 1s., which will not be returned.
Tenders, sealed and endorsed "Retort Benchwork, Contract No. 1, or No. 2" (as the case may be), to be addressed to the Chairman of the Gas and Water Committee, Gas and Water Offices, Boundary Road, Ramsgate, on or before Saturday, April 11, 1903.
The Committee do not bind themselves to accept the lowest or any Tender.
T. N. RITSON, Assoc.M.Inst.C.E.,
Engineer and Manager.
Offices: Boundary Road,
Ramsgate, March 25, 1903.

BOROUGH OF WORKINGTON.
THE Gas Committee desire Tenders for the supply of SULPHATE OF AMMONIA PLANT.
Particulars will be forwarded on Application to the undersigned.
GEO. KEYTE,
Engineer and Manager.

DEVONPORT CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for their requirement, as under, for the Year ending the 31st of March, 1904—namely,
1. TUBES and FITTINGS.
2. OILS and PAINTS.
3. METERS.
4. LEAD and COMPO. TUBE.
5. FIRE-CLAY GOODS.
6. LIME.
7. CARTAGE.
8. SUNDRIES.

Specifications, and Forms of Tender can be obtained on application to the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed as above, to be sent to A. B. Pilling, Esq., Town Clerk, Devonport, on or before the 30th of April, 1903.
SIDNEY E. STEVENSON,
Engineer and Manager.
Gas-Works, Devonport.

CORPORATION OF DEVONPORT.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for 35,000 Tons of GAS COAL, to be delivered during the Year ending June 30, 1904.
Copies of Specification and Forms of Tender may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Tenders for Coal," to be sent to A. B. Pilling, Town Clerk, Devonport, on or before the 9th of May, 1903.
The Committee do not bind themselves to accept the lowest or any Tender.
SIDNEY E. STEVENSON,
Engineer and Manager.
Gas-Works, Devonport.

COUNTY BOROUGH OF WIGAN.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of STORES over the Year ending on March 31, 1904, as follows:—
(*a*) Wrought-Iron Tube and Fittings.
(*b*) Brass and Copper Tube and Fittings.
(*c*) Lead Gas Pipe.
(*d*) Street Lamps.
(*e*) Merchant Iron.
(*f*) Weed Brooms.
(*g*) Shovels and Coke Forks.
(*h*) Wood Troughing and Covering.
(*m*) Galvanized Stove Pipe and Connections.
(*n*) Cast Mains and Connections.
(*o*) Screw and Retort Bolts.
(*p*) Galvanized Buckets.
(*q*) Sulphuric Acid.
(*r*) Sulphur Tar.

Forms of Tender may be obtained from the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender.
Tenders, sealed and endorsed with the name of the Article tendered for, to be delivered to Harold Jevons, Esq., Town Clerk, Town Hall, on or before Monday, the 13th inst.
A sample of each article to be forwarded, addressed to the Gas Engineer.
J. TIMMINS,
Engineer.
Borough Gas-Works,
Wigan, April 1, 1903.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSIONS.

THE above Council invite Tenders for the following Extensions at their Luddenden Foot Gas-Works, which they propose to carry out subject to the sanction of the Local Government Board being obtained to the same.
TENDER No. 1—For the supply and erection of a TWO-LIFT GASHOLDER with Steel Tank, 54 ft. diameter by 18 ft. 9 in. deep.
TENDER No. 2—(*a*) CUTTING OUT EXISTING SINGLE-LIFT from 70 ft. diameter by 26 ft. deep Gasholder and REPLACING WITH ANOTHER LIFT. (*b*) CUTTING OUT EXISTING SINGLE LIFT and REPLACING BY TWO LIFTS with ADDITIONAL GUIDE-FRAMING.
TENDER No. 3—For the supply and erection of a CAST-IRON SCRUBBER, with Washer and Connections.
TENDER No. 4—For the supply and erection of a CAST-IRON PURIFIER, with Connections and Lifting Apparatus.
TENDER No. 5—For the delivery only of Ten 18 in. by 15 in. ⊂ shape MOUTHPIECES, with Lids, &c., complete, Ascension-Pipes, Arch-Pipes, Dip-Pipes, Flue-Boxes, Bends, Buckstays, &c.

All in accordance with Drawings, which can be seen, and Specifications and Forms of Tender obtained, on application to the Engineer, Mr. A. W. Bissell, Gas-Works, Sowerby Bridge.
The Council do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender No. 1, 2, or 3," &c., to be received by the undersigned not later than Twelve o'clock noon on Monday, the 27th of April, 1903
R. W. EVANS,
Clerk to the Council.
Commercial Bank Chambers,
Halifax, April 2, 1903.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Directors of the Bodmin Gas Comsumers' Company, Limited, invite TENDERS for the supply of 1600 Tons of best GAS COAL, to be delivered free at the Company's Siding, adjoining the London and South-Western Company's Station at Bodmin, in such quantities, and at such times, as may be required within Nine Months of the 15th of May, 1903.

Sealed Tenders are to be sent to me not later than Monday, the 4th of May, 1903.

MARK GUY,
Secretary.

TENDERS FOR COAL.

THE Town Council of Newport, Fife
(Gas Department), invite TENDERS for the supply of CANNEL, SINGLE, DOUBLE and TREBLE NUTS, and CAKING DROSS, per ton delivered at their Railway Siding, midway Tayport and Newport, for Twelve Months.

Tenders to be addressed to the undersigned not later than Tuesday, the 14th of April.

The Council do not bind themselves to accept the lowest or any of the Tenders.

JOHN SCRIMGEOUR,
Town Clerk.

Newport, March 30, 1903.

MORLEY CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the supply of the METERS, TUBES, IRON, LIME, OIL, and other SUNDRIES required by them during the Year ending March 25, 1904.

Forms of Tender, with full Particulars, may be obtained on application to H. J. Hemingway, Gas Office, Town Hall.

Tenders to be sent to the undersigned not later than Saturday, April 18.

FRED THACKRAY,
Town Clerk.

Town Hall, Morley,
April 4, 1903.

BOROUGH OF TORQUAY.

ST. MARY CHURCH GAS UNDERTAKING.

THE Gas Committee of the Torquay Town Council invite TENDERS for the supply and delivery of the following GAS-PIPES :—

1580 yards of 12-inch Pipes.
580 ,, ,, 10-inch ,,

Further Particulars, Specification, and Form of Tender, may be obtained from Mr. Francis Chalmers, Engineer, St. Mary Church Gas-Works, Torquay.

Tenders to the undersigned by Twelve noon on the 23rd of April, 1903.

The Committee do not bind themselves to accept the lowest or any Tender.

FREDK. S. HEX,
Town Clerk.

Torquay, April 1, 1903.

TO GASHOLDER MAKERS.

THE Directors of the Knutsford Light and Water Company are prepared to receive TENDERS for the Construction and Erection of a GAS-HOLDER, 88 feet diameter and 22 feet deep, and Connections to same.

Full Particulars may be obtained from Messrs. Thomas Newbigging and Son, Engineers, 5, Norfolk Street, Manchester, on deposit of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Gasholder," to be sent to the undersigned not later than noon on Monday, the 20th day of April.

The Directors do not bind themselves to accept the lowest or any Tender.

W. S. INMAN.
Secretary.

Offices: Princess Street, Knutsford.
April 4, 1903.

LEEDS CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the supply of CAST-IRON PIPES, RETORT CASTINGS, &c.

Samples may be seen on application at the Stores Department, 21, Dewsbury Road; and Forms of Tender and Specification may be had on application to the undersigned.

Endorsed Tenders, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, must be delivered not later than Monday, the 20th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, Municipal Buildings,
Leeds, April 4, 1903.

LEEDS CORPORATION.
(GAS DEPARTMENT.)

TO ENGINEERS AND CONTRACTORS.

THE Gas Committee are prepared to receive TENDERS for the supply and erection of the STEEL WORK required for New Purifier-House at their Dewsbury Road Works.

Drawings may be seen, and Specification and Bill of Quantities obtained, on application to the undersigned.

Sealed Tenders, addressed to the Chairman of the Gas Committee and endorsed "Tenders for Purifier-House," must be delivered at the Gas Offices, Municipal Buildings, Leeds, not later than Saturday, the 18th day of April, 1903.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, Municipal Buildings,
Leeds, April 4, 1903.

COUNTY BOROUGH OF BURY.

TO SULPHURIC ACID MAKERS.

THE Gas Committee are prepared to receive TENDERS for the supply of about 400 Tons of SULPHURIC ACID for the manufacture of Sulphate of Ammonia for a period of One Year from the 1st of May, 1903.

Forms of Tender and Conditions may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Sealed Tenders, endorsed "Tender for Acid," to be sent to the undersigned on or before Monday, the 20th day of April, 1903.

JOHN HASLAM,
Town Clerk.

Bank Street, Bury,
March 27, 1903.

GLASTONBURY CORPORATION.
(GAS DEPARTMENT.)

INCANDESCENT STREET-LAMPS.

THE Gas Committee invite Tenders for the supply of upwards of 50 14-inch (at waist) INCANDESCENT STREET LAMPS, made of copper throughout, fitted up with Incandescent Burners (without bye-pass), with Anti-Vibrator and Governor to consume 4 cubic feet per hour; also wrought-iron chair. Other approved forms of Incandescent Lamps may be considered.

The Lamps to be of the best workmanship and finish.

Form of Tender may be obtained from the undersigned.

The lowest or any Tender not necessarily accepted.

Tenders to be sent in not later than April 18, 1903, addressed to A. W. T. Baily, Esq., Chairman of the Gas Committee, and endorsed "Tender for Lamps."

D. E. GARLICK,
Manager and Secretary.

REDHILL GAS COMPANY.

SALE OF ORDINARY "B" STOCK.

NOTICE is Hereby Given, that it is the intention of the said Company to SELL BY TENDER, £5655 of ORDINARY "B" Stock of and in the Redhill Gas Company. The last day for the reception of Tenders will be Thursday, the 16th day of April next, at Twelve o'clock noon.

Forms of Tender, with Particulars of Sale and Conditions of Tender attached, can be had upon application at the Company's Office, Brighton Road, Redhill.

By order,
C. READ,
Secretary.

Redhill, Surrey,
March 26, 1903.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF FOUR PER CENT. PREFERENCE STOCK.

MINIMUM PRICE, £102 10s. PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors to SELL BY TENDER, FIFTY THOUSAND POUNDS of the NEWCASTLE-UPON-TYNE and GATESHEAD GAS PREFERENCE STOCK, 1901, entitled to a fixed Preferential Dividend of Four Pounds per Centum per Annum payable out of the Profits of each Year in priority to any Dividends on the Ordinary Stock, to be issued under the powers of the Company's Act of 1901.

Particulars and Forms of Tender may be obtained on application to the undersigned, and Tenders must be sent in so as to be received at the Office of the Company not later than Ten a.m. on Tuesday, the 21st of April, 1903.

The Stock will be allotted to the highest Tenderers, but no Tender will be accepted at a lower Price than £102 10s. per cent.

THOMAS WADDOM,
Secretary.

Office: 35, Grainger Street West,
Newcastle-upon-Tyne,
April 1, 1903.

YORK UNITED GASLIGHT COMPANY.

SALE BY TENDER OF PREFERENCE STOCK,

Under the Provisions of the York United Gaslight Company's Act, 1898.

NOTICE is Hereby Given, that, in pursuance of a Resolution passed at a Meeting of the Company specially convened for the purpose and held on the 26th day of March, 1903, it is the intention of the Directors to SELL BY TENDER £40,000 PREFERENCE STOCK, entitled to a Maximum Preferential Dividend of £4 per cent. per annum, and to be paid up in full on or before the 30th day of May, 1903; being a portion of the Additional Capital authorized to be raised under the above-named Act.

Particulars and Conditions of Tender may be obtained on application at the Gas Company's Office, Davygate, York, or at the York City and County Bank, or any of its Branches; and sealed Tenders, marked "Tender for York Gas Stock," must be lodged with the Gas Company, Davygate, York, or with the York City and County Banking Company, Limited, York, or any of its Branches, not later than Ten o'clock a.m. on Monday, the 27th of April, 1903.

By order,
MATTHEW LEAF,
Secretary.

Gas Offices, Davygate,
York, March 27, 1903.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

NEW ISSUE OF 575 £10 "F" ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
TONBRIDGE GAS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

WEST KENT GAS COMPANY.

100 £10 FULLY-PAID ORIGINAL SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
DOVER GAS COMPANY.

ISSUE OF £5000 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 28, a Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HORLEY DISTRICT GAS COMPANY.

NEW ISSUE OF £5000 FIVE PER CENT. PREFERENCE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 28, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SOUTH SHIELDS GAS COMPANY.

ISSUE OF 3½ PER CENT. MORTGAGE BONDS.

THE Directors are prepared to receive APPLICATIONS for £10,000 MORTGAGE BONDS, at the above rate, less income-tax, in multiples of £100, for a term of not less than Three Years, repayable at any time after that period by a Six Months' Notice on either side.

Interest payable Half Yearly, on the 30th of June and the 31st of December in each year.

Applications will be accepted in the order in which they are received.

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, March, 1903.

READING GAS COMPANY.

ISSUE OF DEBENTURE STOCK BY TENDER.

NOTICE is Hereby Given, that the Reading Gas Company Offer for SALE BY TENDER £14,344 FOUR PER CENT. DEBENTURE STOCK, being a portion of the Additional Capital Authorized to be raised under the Reading Gas Act, 1902; and the Directors will be prepared to receive sealed Tenders, not later than Twelve o'clock noon, on Thursday, the 9th day of April, 1903.

By the Trustee Act, 1893, it is provided that a Trustee having power to invest in the Mortgages or Bonds of a Company may, unless the contrary is expressed in the instrument authorizing the investment, invest in the Debenture Stock of such Company.

Particulars and Conditions of Sale, with printed Form of Tender, can be obtained on application to the Secretary.

By order,
ARTHUR H. CANE,
Secretary.

7, King Street, Reading,
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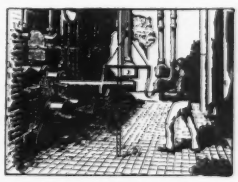

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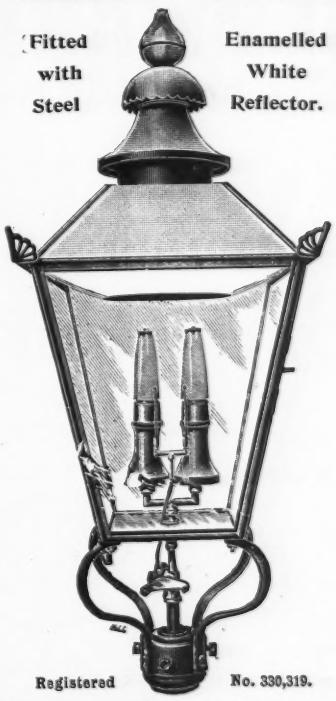

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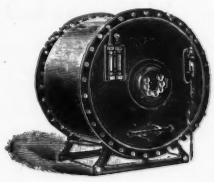

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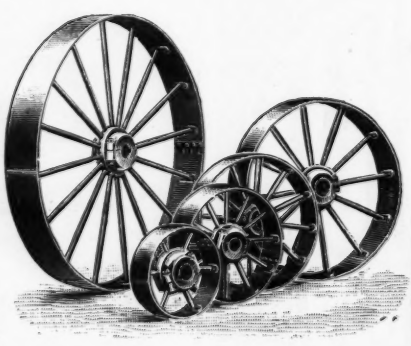

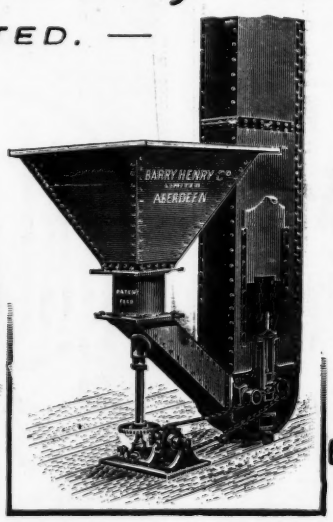

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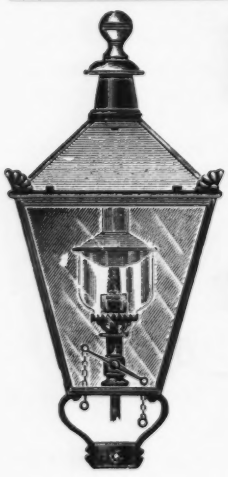

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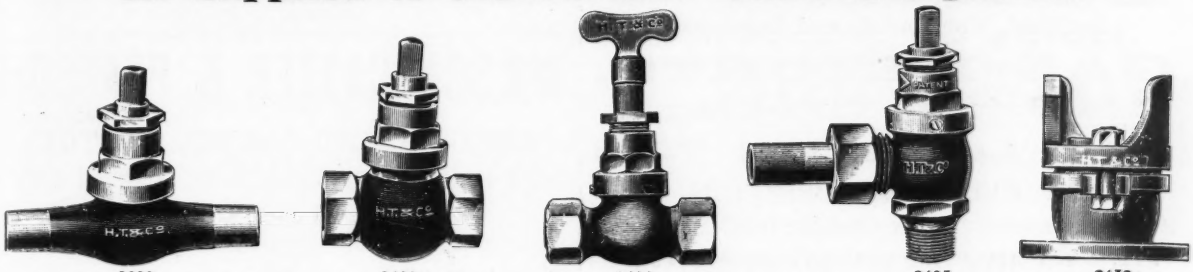

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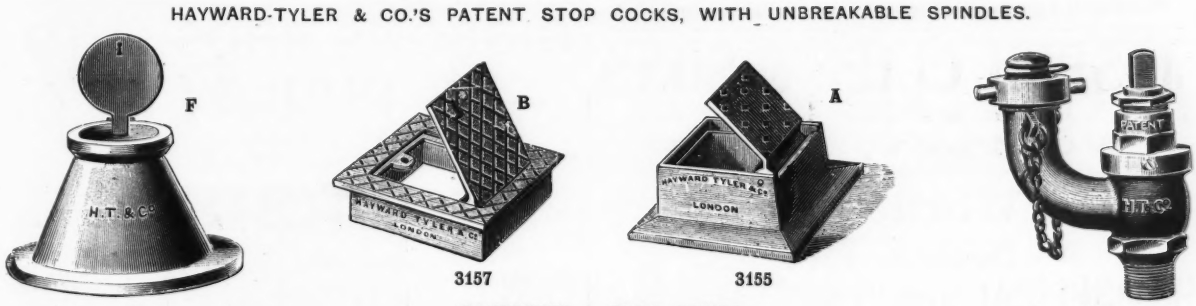

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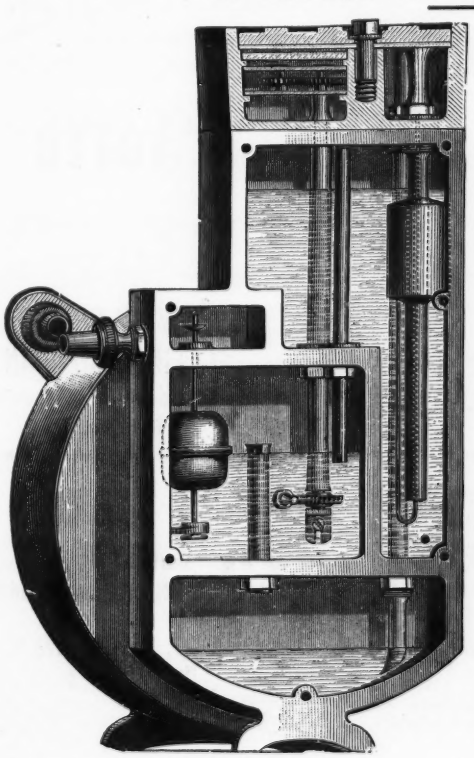

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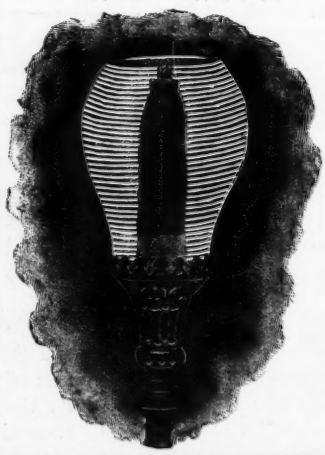

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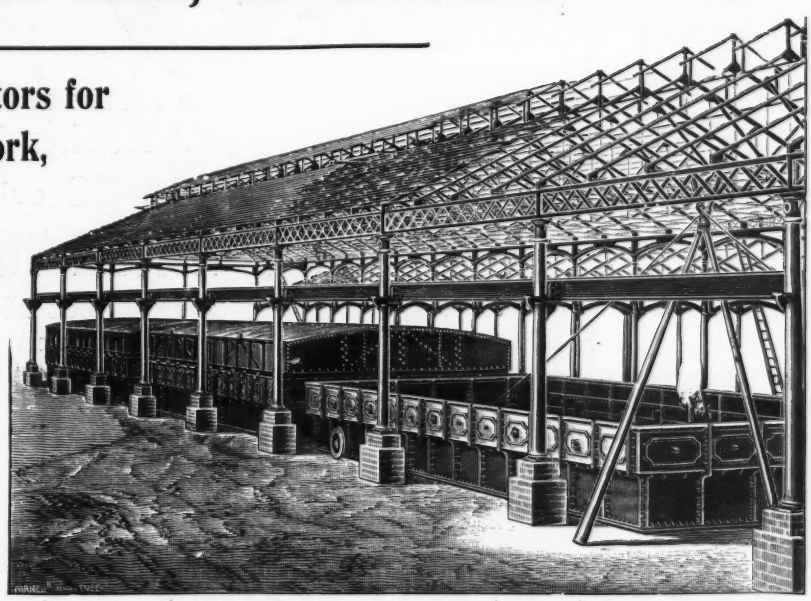

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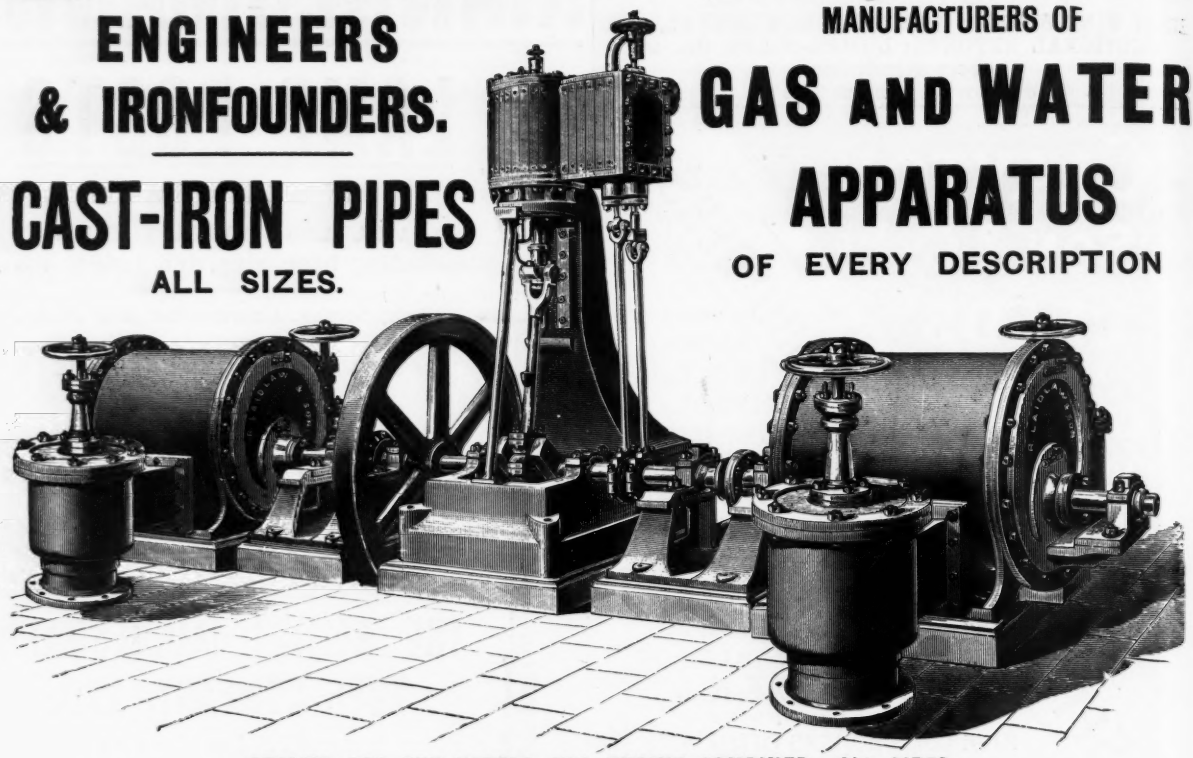

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